Pacing of Activity as a Predictor of Agitation for Persons with Dementia in Acute Care

External factors are hypothesized to have a strong impact on persons with dementia, with both positive and negative influences on well being (Hall & Buckwalter, 1987). Admission to the hospital is an external factor associated with negative consequences for persons with dementia including delirium, decreased functional status, increased behavioral symptomatology, and more frequent admission to long-term care (Cox & Verdieck, 1994; Erkinjuntti, Wikstrom, Palo, & Autio, 1986; St. Pierre, 1998).

Hospitalization brings changes in environment, daily activity, and social milieu. The person who is hospitalized may experience changes in patterns of rest, activity, and sleep. The person may experience periods of high stimulus activity and periods of sensory deprivation. Persons with dementia may be less able to adapt to these external stressors (Cohen-Mansfield & Werner, 1995).

The purpose of the present study is to describe the pacing of activity in the acute care setting and to examine the relative contribution of activity variables in predicting the occurrence of agitation during 30-minute time periods. Pacing refers to the pattern of experiencing stimulating and calming activities during time periods from morning until night. In this study, activity is defined as what the patient was doing or what was being done to the patient and was ranked with a 4-point classification from sleep to active. This study also investigates if sustained activity, defined as 90 minutes at the same level of awake activity, is a factor associated with the development of agitation for persons with dementia.

RESEARCH QUESTIONS
1. What is the activity and agitation for 30-minute time periods in acute care?
2. Are agitation scores associated with:
   - The type of activity.
   - The noxiousness (i.e., unpleasantry) of the activity.
   - If the length of the activity was or was not sustained over a 90-minute time period.

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3. What is the unique contribution of sustaining vs. not sustaining activity to agitation scores?

**BACKGROUND**

The purpose of an acute nonprofit psychiatric hospital admission is to treat and restore physiological health while not causing harm. It is precisely these two goals of restoring physiological health and avoidance of iatrogenesis that mandate an examination of the interplay between the hospital experience of people with dementia and psychosocial variables. For a person trying to recover from a physiological alteration in health, the added physiological stress related to potentially negative experiences associated with hospitalization may delay or prevent recovery.

The physiological components of the stress response are associated with increased morbidity and mortality (Guyton & Hall, 1996). Nursing interventions that decrease stress responses and negative hospital experiences may facilitate recovery.

Delirium and agitation are common occurrences in the hospital. As much as two-thirds of delirium cases in the hospitalized older adult occur superimposed on dementia (Inouye, 1994). Lack of rest and sleep among hospitalized patients are also well documented (Sands, 1999). Delirium, agitation, and sleep–rest deprivation all impose physiological stress on a body that should be directing physiological reserves toward recovery from illness.

The Model of Imbalances in Sensoristasis (MIS) (Kovach, 2000) (Figure), postulates that some of the agitated behaviors and declines in physical and social functioning of older adults with dementia can be attributed to imbalances in the pacing of sensory stimulating and sensory calming activity. Sensoristasis is defined as a state of equilibrium of the sensory arousal system of the person with dementia that is maintained by a dynamic balance of sensory stimulating and sensory calming activity, while controlling for the pleasantness or noxiousness of the activity.

The attribution of pleasantness or noxiousness of an activity is determined by the individual and varies from person to person. Imbalances in sensoristasis that yield too much high stimulus activity exceed the person's stress threshold while those imbalances that yield too much low stimulus activity create a state of sensory deprivation. Imbalances in sensoristasis can be caused by a variety of factors including circadian rhythm disturbance, environmental factors, and human intervention. Consequences of imbalances in the pacing of sensory-stimulating or sensory-calming activity include agitated behavior and functional decline.

Considerable clinical and empirical effort has been focused on the activity and sensory needs of people with dementia in long-term care. The Philadelphia Geriatric Center has begun a program for long-term care patients with dementia that focuses on the need for a balance between stimulation and retreat (Lawton, Van Haitsma, & Klapper, 1994). Other special care units in long-term care address the need for a calm environment through architectural design and other environmental features, and use a variety of therapeutic activities to meet needs for activity (Buettner, Lundegren, Lago, Farrell, & Smith, 1996; Cohen-Mansfield & Weisman, 1991).

Stimulating multiple senses was correlated with longer active engagement in an activity for persons with late-stage dementia (Kovach & Magliocco, 1998). Provision of positive therapeutic activity is associated with reduced disruptiveness, agitation, and wandering (Stokes, 1990). It is hypothesized that these positive stimulating activities provide distraction, reduce boredom, and channel physical energy. Pulsford (1997) anecdotally observed a relationship between an understimulating environment and agitation and wandering.

<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Imbalances in sensoristasis</th>
<th>Cortical sequelae</th>
<th>Behavioral sequelae</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Neurophysiological decline</td>
<td>• High stimulus imbalance</td>
<td>Stress threshold exceeded</td>
<td>• Agitated behavior</td>
</tr>
<tr>
<td>• Circadian rhythm disturbance</td>
<td>• Low stimulus imbalance</td>
<td>Sensory deprivation</td>
<td>• Episodic and/or premature declines in instrumental and social function</td>
</tr>
<tr>
<td>• Human intervention</td>
<td></td>
<td>Intrapsychic discomfort</td>
<td></td>
</tr>
<tr>
<td>• Environmental factor</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure. Model of imbalances in sensoristasis.**
The pacing of activity of persons with dementia in acute care has not been studied. In normal patients, sensory deprivation or overstimulation can result in confusion. Twenty-nine percent of healthy young adults placed in a simulated hospital room developed subjective sensory distortions after 2.5 hours (Downs, 1974). It is hypothesized that the need of the brain for stimulation is so great that, when deprived, perceptual distortions are created as a means of self-stimulation.

A considerable body of literature exists on the detrimental effects of sensory deprivation, sensory overload, and perceptual alterations in acute care (Griffin, 1992; Grunet, 1993; Topf, 1992). With dementia, there is increased sensitivity to stimulation, with a decreased ability to separate out and ignore unnecessary stimuli (Calkins, 1991). The hospital environment may limit sensory experience by imposing restrictions on the ability to normally perceive tactile, auditory, or visual stimulation. Individuals may be without hearing aids or glasses, and may experience additional tactile restriction or stimulation from dressings, casts, or restraints.

Perceptual deprivation may be created by the monotony of the environment, especially the droning of equipment and alarms. Social isolation may also occur if the person has few visitors or meaningful social contacts with staff. The British journal Nursing Standard devoted a 7-month series to dementia in acute care. Precipitating factors to agitated behaviors described in this series include: not providing a reasonable level of activity and conversation, noise and disturbance levels at night, and ignoring sensory deficits (Holden, 1994). Recommendations for intervention include: empathic communication, therapeutic activities, sensory stimulation, and attending to sensory deficits induced by hearing and visual losses (Allan, 1994; Holden, 1994; King & Watt, 1995).

Persons with dementia who enter the acute care environment may experience changes in activity, sensation, and perception. These changes may be particularly stressful for the person with dementia and place them at risk for other negative outcomes including agitation, delayed recovery, and superimposed delirium. Previous studies have not examined the pacing of activity in the acute care environment and the role of pacing of activity in predicting agitated behavior.

**SAMPLE**

The unit of analysis for this study is the 30-minute time period. This time period was chosen because the interest was in a general assessment of activity and agitation levels over daytime hours rather than a minute-to-minute examination of patterns of behavior. The sample size was 429 time period units that were collected between 7:30 a.m. and 10:00 p.m. over 5 days. The study occurred in a 485-bed academic health care center in the Midwest. Two medical units were chosen for the study based on the large population of older adult admissions to these units: an 18-bed unit providing nursing care to patients from the geriatric and family practice services and a 27-bed unit providing care to patients from general medicine, combined medical, and renal services.

**TABLE 1**

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Sleep/Dozing</th>
<th>Null</th>
<th>Quiet</th>
<th>Active</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning 8am to 12:29pm</td>
<td>24</td>
<td>25</td>
<td>10</td>
<td>76</td>
<td>135</td>
</tr>
<tr>
<td>Afternoon 12:30 to 4:59pm</td>
<td>40</td>
<td>35</td>
<td>7</td>
<td>53</td>
<td>135</td>
</tr>
<tr>
<td>Evening 5:00 to 9:30pm</td>
<td>34</td>
<td>50</td>
<td>16</td>
<td>35</td>
<td>135</td>
</tr>
<tr>
<td>Total</td>
<td>98</td>
<td>110</td>
<td>33</td>
<td>164</td>
<td>405</td>
</tr>
</tbody>
</table>

Chi square = 31.91, p = 0.000

**TABLE 2**

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Type of Sustained Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Null</td>
</tr>
<tr>
<td>Morning 8am to 12:29pm</td>
<td>4</td>
</tr>
<tr>
<td>Afternoon 12:30 to 4:59pm</td>
<td>18</td>
</tr>
<tr>
<td>Evening 5:00 to 9:30pm</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

Chi square = 35.80, p = 0.000
**TABLE 3**

Differences in Noxiousness of Activity During Morning, Afternoon, and Evening Hours

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Noxiousness</th>
<th>Pleasant/Neutral</th>
<th>Unpleasant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning 8am to 12:29pm</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td></td>
</tr>
<tr>
<td>Afternoon 12:30 to 4:59pm</td>
<td>107</td>
<td>28</td>
<td>135</td>
<td></td>
</tr>
<tr>
<td>Evening 5:00 to 9:30pm</td>
<td>127</td>
<td>8</td>
<td>135</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>334</td>
<td>71</td>
<td>405</td>
<td></td>
</tr>
</tbody>
</table>

Chi square = 35.80, p = 0.000

To obtain these data, six patients from the two medical units were observed. Three of the patients had a mechanical restraint in place and five of the six had an intravenous (IV) line in place. To obtain the desired number of time period units, five of the six patients were observed over 3 consecutive days and one patient was observed during 1 day. No persons observed were sedated for a procedure or given general anesthesia during the data collection period. Written consent was obtained from the patient or guardian before data collection.

Five patients were women and one was a man. All had a diagnosis of dementia prior to admission to the hospital. Admitting diagnoses, noted on hospital records, were renal failure (2), failure to thrive (2), pneumonia (1), and bleeding diverticula (1). The average age of patients observed was 82.5, with a range of 68 to 92. Patients scored from 0 to 12 on a 21-item Mini-Mental Status Examination (MMSE) with an average MMSE of 9 (Folstein, Folstein, & McHugh, 1975). The 21-item form excludes nine items that comprise the language portion of the test because of a concern about the ability of acutely ill patients to complete the tasks required in this section (e.g., fold a piece of paper, write a sentence, copy a diagram). This 21-item tool was compared with the 30-item MMSE and the Spearman rank correlation was .90 (Sager et al., 1996).

**METHODS**

This is a descriptive study with no intervention. Data were not collected on the day of admission to the hospital. Data were collected from 7:30 a.m. to 10:00 p.m. on weekdays. Observations of activity and agitation were made at least three times during each 30-minute time period. The first author (C.K.), a graduate nursing student, and an undergraduate nursing student collected data. The data collectors made an effort to be unobtrusive during the data collection and acted as a nonparticipant observer.

**MEASUREMENT**

Interrater reliability estimates for 13 units of analysis, calculated as percentage agreement between two raters, were .74 for activity, .92 for noxiousness, and .84 for agitation. Data collectors were trained to record observed behavior according to specifically defined parameters. A data collection sheet was used to record observations of activity, noxiousness, and agitation.

**Activity**

Activity is defined as what the patient was doing or what was being done to the patient. Activity was ranked according to the following classification:

- S = (sleep) eyes are closed in apparent sleep or dozing.
- N = (null) eyes are open but not focused on a particular event or person, with no apparent purposeful activity.
- Q = (quiet activity) person is doing a quiet activity calmly (e.g., watching television, looking at a magazine, music listening).

**TABLE 4**

Hierarchical Regression Analysis: Predictors of Agitation by Noxiousness of Activity and Whether the Activity Was Paced or Sustained

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>R²</th>
<th>R² Change</th>
<th>F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noxiousness</td>
<td>.567</td>
<td>.322</td>
<td>.322</td>
<td>141.22*</td>
</tr>
<tr>
<td>Paced vs. sustained activity</td>
<td>.606</td>
<td>.367</td>
<td>.046</td>
<td>21.523*</td>
</tr>
</tbody>
</table>

* Significant p < .001
A = (active) person is doing an activity or having an activity done to them that involves more than minimal movement or is a disruption of a sleep, null, or quiet activity state (e.g., bathing, walking, physical treatment, examination).

Patients were observed for at least 2 minutes per observation and were observed at least three times during the 30-minute time period. Observations occurred at approximately 10-minute intervals. The most active activity during the 30-minute time period was recorded on the data collection sheet.

Noxiousness

Noxiousness is an assessment of whether the activity was unpleasant or not. Though there was a clear need to account for the unpleasantness of activity in an acute care setting, data collectors did not ask the patient if they liked or disliked an activity, because of concern that this questioning would influence activity. The data collector, therefore, only marked an activity unit as unpleasant if most individuals would have considered it an unpleasant experience. For example, having a blood sample drawn was only marked as unpleasant if it was clear it was a difficult venipuncture. Units that were not coded as unpleasant were placed in the pleasant/neural category.

A 100 mm Visual Analog Scale was used to assess agitation as conceptualized by the 29 items on the Cohen-Mansfield Agitation Inventory (Cohen-Mansfield, 1999). Student data collectors were trained by the principal investigator to mark an area along the scale with 0 indicating no agitation, 50 indicating one moderately intense agitated behavior or more than one low intensity agitated behavior, and 100 indicating one agitated behavior such as needless body movement was intense or more than one behavior was moderately intense.

When a patient left the acute care unit for a test or procedure, a data collector was most often able to follow the patient off the unit and make observations.

RESULTS

The data set included 429 units. The most common activity was active activity which comprised 39.8% of the units (N = 171). Null activity occurred during 27.2% (N = 117) of the units, sleep/dozing occurred during 25.1% (N = 108) of the units, and quiet activity was the least frequent type of activity (7.7%, N = 33). To compare activity during different times of day, equal blocks of time yielded 135 units each in the morning, afternoon, and evening. As seen in Table 1, there was a statistically significant difference in the type of activity during morning (i.e., 8 a.m. to 12:29 p.m.), afternoon (12:30 p.m. to 4:59 p.m.), and evening (5:00 p.m. to 9:30 p.m.) hours (χ² = 31.91, p = 0.000). Active units occurred most often in the morning hours and the most null behavior occurred in the evening.

For the purposes of analysis, a 30-minute time period was considered sustained if, retrospectively, the same activity had been occurring over three consecutive time periods (i.e., 90 minutes) or longer. The 90-minute time period was chosen to signify sustained activity based on clinical expertise of the researchers with dementia care and following consultation with two advanced practice nurses with expertise in dementia care. A 30-minute time period was considered not sustained if the same activity had been occurring over less than three consecutive time periods.

For 413 units, it was determined if the unit was sustained or not sustained. One hundred and eleven (27%) of these units were sustained and 302 were not sustained (73%). There was not a difference in frequency of activity units that was sustained or not sustained during the day, afternoon, and evening hours (χ² = .135, p = .935). There was, however, a statistically significant difference in the type of sustained activity that occurred during different times of the day. As seen in Table 2, sustained active activity occurred most often during the day and afternoon hours, and sustained null activity occurred most often during the evening hours.

There was a statistically significant difference in frequency of unpleasant vs. pleasant/neutral units during various times of day. As seen in Table 3, most of the unpleasant activity units occurred in the morning and afternoon and the least number occurred in the evening.

The average agitation score was 31.35. Agitation scores ranged from 0 to 100 and the spread of scores was large, with a standard deviation of 33.43. There was a statistically significant difference in agitation scores during the day, afternoon, and evening hours (F = 7.389, p = 0.000) with the highest agitation scores in the afternoon (M = 38.11, SD = 37.38). The lowest agitation scores were recorded in the evening (M = 23.80, SD = 27.56). The average agitation score in the morning was 28.64, with a standard deviation of 30.56.

When performing inferential testing of the relationship of sustained activity to agitation, the sleep/dozing category was omitted from the analysis. During deep sleep, agitation was either 0 or minimal, therefore including these data would have distorted results.

Only 1.3% of the variance (F = 1.195, p = .277) in agitation was accounted for by whether the sustained activity was active or null activity. Because this variable accounted for so little variance, it was not used in further analyses.

The average agitation score for sustained activity units was 57.91 (SD = 31.88) and for nonsustained units was 33.93 (SD = 31.81). Hierarchical regression analysis was used to determine the relative contribution of variables in predicting agitation. Table 4 shows that 32% of the variance in agitation was associated with noxiousness of activity and whether the
KEYPOINTS

PACING OF ACTIVITY AS A PREDICTOR OF AGITATION


1 Imbalances in pacing of sensory stimulation and sensory calming activity may contribute to agitation and functional decline in persons with dementia.

2 This study showed that sustained low and high stimulation activity were associated with increased agitation levels for persons with dementia in acute care.

3 Pacing the activity of persons with dementia is a relatively easy and cost-effective intervention that may decrease problems such as agitation. Providing a balanced activity schedule that does not overly stress or deprive the person of stimulation may constitute a fundamental tenet of providing nursing care to persons with dementia.

Activity was sustained or not sustained. There was not a significant interaction effect for the variables noxiousness and sustained activity (p = .622). In other words, the relationship between sustained/not sustained activity and agitation was not dependent on if the activity was unpleasant or pleasant/neutral.

The unique contribution of sustained pacing of activity was of central interest, so this variable was added into the regression equation last. Results showed that 4.6% of the variance in agitation was uniquely accounted for by the activity being sustained or not sustained. This was a statistically significant contribution (p = 0.000).

DISCUSSION AND NURSING IMPLICATIONS

The focus of treatment in the hospital is on physical pathology. Many clinicians have described the need for a paradigm of dementia care that acknowledges the interplay between physical, environmental, and psychosocial factors (Engel, 1992; Kitwood & Bredin, 1992; Taft, Fazio, Seman, & Stansell, 1997).

While the small number of patients in this study limits generalizability, results include a preponderance of active activity, unpleasant activity, and sustained activity in acute care. Agitation scores were considerably higher during the sustained activity, and, consistent with the MIS, agitation scores were not significantly influenced by whether the sustained activity was active or null. Future research is needed to explore the actual opportunity for nurses to balance activity in the acute care setting, as well as the feasibility of attempting to control access to the patient to allow for more rest periods.

Unpleasant activity was not uncommon and was associated with higher levels of agitation. There was considerable overlap between sustained active activity and unpleasant activity. Diagnostic and treatment needs may at times necessitate sustained unpleasant activity. There may, however, be an opportunity for nurses to intervene on behalf of the patient by scheduling a rest period within the constraints of the treatment plan and daily activity of a busy acute care unit.

Considerable literature supports that some of the negative consequences of unpleasant treatments and activities for persons with dementia may be ameliorated by therapeutic communication (Kovach & Meyer-Arnold, 1996; Sloane et al., 1995). Even though this study did not measure therapeutic communication, anecdotal observation during the data collection showed several instances in which therapeutic communication from a nurse or family member was associated with an immediate decrease in level of agitation. While more research is needed, persons with dementia in acute care who are undergoing unpleasant treatment or other sustained unpleasant activity may benefit from reassuring supportive communication from the nurse.

Providing stimulating activity, including positive socialization, may diminish some of the negative effects of sustained null behavior. Interventions that should be tested include the effects of balanced pacing of active and calm activity and the effects of therapeutic interventions during sustained activity on outcomes such as agitation, delirium, functional decline, and other iatrogenesis.

There are no parameters for guiding the optimum pacing of activity for persons with dementia in acute care. This study describes pacing of activity during day, afternoon, and evening hours. Results suggest that when activity is sustained for 90 minutes or longer, agitation is significantly higher. Future research is needed to assist nurses in determining optimum pacing cycles for activity and rest.

Although this study is important as a step in examining the pacing of activity in acute care, activity is not a singular construct. This study was able to examine the type and noxiousness of activity, but other variables that may be relevant include
the amount and quality of sensory stimulation provided, the familiarity of the activity, the demand character of the activity relative to the competency of the person, and the social quality of an activity. Understanding the complexity inherent in activity will better help elucidate the relationship between activity and behavioral outcomes.

Humane and dignified care in the hospital necessitates that nurses place a larger emphasis on comfort and quality of daily life. The hospital is a place where individuals go for healing. Providing an environment and activity schedule that does not overly stress the person may constitute a fundamental nursing tenet of helping the person to heal. The outmoded view of palliative care was that it was reserved for patients in the dying process. It is now recognized that palliative care is needed in some capacity by all patients who enter the acute care system. If nurses and other health care professionals do not set goals for both curative and palliative care outcomes, patient care will be incomplete and substandard, and may impede healing and cause iatrogenesis.

REFERENCES


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