Management of Behavioral Symptoms in Progressive Degenerative Dementias

Ladislav Volcer and Ann C. Hurley

Management of behavioral symptoms of Alzheimer’s disease and other progressive degenerative dementias poses a continuous challenge to both family and professional caregivers. Behavioral symptoms are complex in nature and require that caregivers understand their presumed causes and intervene appropriately using validated caregiving techniques. Unfortunately, confusing terminology hampers improvement in management techniques. This review attempts to clarify terminology and specifically the behavioral symptoms “agitation” and “resistiveness to care” that require different management techniques. Several conceptual frameworks for behavioral symptoms of dementia are presented. These frameworks include behavioral models, a psychiatric model, and a comprehensive model that combines both behavioral and psychiatric strategies. Using precise terminology consistently and providing care based on a conceptual framework will facilitate the education of caregivers in appropriate techniques for management of behavioral symptoms of dementias.

Progressive degenerative dementias, Alzheimer’s disease, dementia with Lewy bodies, vascular dementia, and frontotemporal dementia often cause not only cognitive and functional impairment but also behavioral symptoms as recently discussed in the Journal (1,2). Management of these behavioral symptoms is often more distressing for dementia caregivers than management of cognitive and functional deficits, and may be the main reason for institutionalization of an individual with dementia (3–5). In the early stages of different progressive degenerative dementias, specific behavioral symptoms appear, e.g., social disinhibition in frontotemporal dementia and visual hallucinations in dementia with Lewy bodies, but in the later stages, the behavioral symptoms are similar in all of these dementias. It is important to distinguish between progressive degenerative dementias and dementias occurring in chronic psychiatric illnesses, head trauma, and alcohol abuse because behavioral symptoms and their management in those conditions are very different and will not be covered in this review.

Management of behavioral symptoms of dementia is important for persons who suffer from dementia, their family and friends, and professional caregivers regardless of caregiving setting. Over 70% of the more than 4 million Americans with Alzheimer’s disease live at home and 75% receive care from family and friends (6). Many family caregivers have difficulty managing behavioral symptoms of community-dwelling persons with dementia, especially verbal and physical agitation, found to occur in 86% and 55%, respectively (7). A community sample of individuals with dementia found that 61% exhibited behavioral problems in the preceding month, apathy (27%), depression (24%), and agitation/aggression (24%), with adverse effects on both persons with dementia and their caregivers (8). Behavioral symptoms are a major cause of burden for community caregivers, rated as severe burden in 72% (9).

Behavioral symptoms of dementia are also very common in nursing home residents. Cohen-Mansfield (10) reported that two agitated behaviors occurred at least once a week in 87% of nursing home residents with dementia, and Ryden and colleagues (11) found “aggressive behavior” to be present in 86%. In probability samples drawn from all nursing home residents (not only those with dementia), estimates of the prevalence of disruptive behaviors range from 26% to 64% (12,13). Behavioral symptoms are also problematic in other settings; e.g., when the person with dementia has a health problem requiring diagnostic tests (14), emergency care (15), or hospitalization (16).

Behavioral symptoms may start before diagnosis of dementia is made and may be the trigger that promotes obtaining a medical evaluation. Retrospective medical record review of individuals with pathological confirmation of diagnosis of Alzheimer’s disease showed that many symptoms were reported up to 3 years before the diagnosis was made (17). The earliest symptom was social withdrawal followed by depression and paranoid delusions. Changes of diurnal rhythms and anxiety occurred shortly before diagnosis, with irritability, agitation, socially unacceptable behavior, and wandering occurring during the first year after diagnosis. The presence of psychiatric symptoms of dementia has also predicted a faster rate of deterioration (18,19).
Physical Causes

Before any “abnormal” behavior is attributed to dementia, a comprehensive assessment should be conducted to identify the cause(s). Potential physical causes of such behaviors have to be excluded, and this is often difficult in individuals with advanced dementia who are aphasic and cannot communicate symptoms of physical illnesses. Abnormal behavior may be caused or exacerbated by many illnesses, such as cardiovascular disease, chronic obstructive pulmonary disease, brain tumors, infection, depression, anemia, and metabolic disorders. The metabolic disorders include renal failure, dehydration, hyponatremia, acid-base disturbance, hypoglycemia or hyperglycemia, hepatic failure, thyroid dysfunction, and hypercalcemia. Sensory deprivation and drugs may also elicit abnormal behavior.

Behavioral symptoms of dementia may be aggravated by nutritional deficiencies. Protein energy malnutrition is associated with cognitive decline and is common in elderly individuals (20), especially those who are cognitively impaired (21). Individuals with dementia, and especially those with behavioral symptoms, consume most calories during breakfast (22), yet current meal delivery practices are not consistent with this diurnal eating pattern (23). Very often, caregivers of individuals with dementia do not have sufficient time to provide adequate nutrition (24), and that may result in further cognitive impairment and behavioral symptoms.

The most common physical cause of abnormal behavior, however, is unrecognized and untreated pain, and a change in behavior may signify pain (25). The pain could result from fecal impaction, urinary retention, unrecognized fracture, or surgical abdomen, but the most common cause of chronic pain in nursing home residents is arthritis, followed by old fractures, neuropathy, and malignancy (26). Use of visual analogue scales is one method of identifying pain in persons with dementia, but is limited to patients who can comprehend the meaning of the scale (27). A comprehensive evaluation of pain in noncommunicative individual relies on observation of facial expression, vocalization, and body movements and tension. A previous limitation in assessing pain in dementia, lack of behavioral observation scale, had been rectified by 2 recently developed scales for assessing pain in dementia, lack of behavioral observation and are without subjective interpretation, are not strictly behaviors that are invoked by caregiving activities, are unrelated to known physical needs of the patient that can be remedied, and are without known motivational intent (32). Therefore, before labeling any behavior as agitation, physical and environmental causes of the behavior should be eliminated. These causes include untreated pain, hunger, thirst, inappropriate environmental temperature, noise, and so forth. Agitation should be treated according to the primary consequence(s) of dementia (see below) that is/are the actual cause of agitated behaviors. Responses to treatment can be measured by a direct observation (32).

Terminology

Various terms are used to label behavioral symptoms of dementia: agitation, obstreperous behavior, catastrophic reaction, aggressiveness, assaultiveness, and so forth. Usually, these terms are neither well defined nor helpful in guiding decision-making regarding treatment strategies, and focus on the effect of the behavior on others rather than on the person with dementia who suffers because of those symptoms or who uses those behaviors to communicate.

Agitation

Agitation is the term used in pioneering research by Jiska Cohen-Mansfield to describe all behavioral symptoms of dementia (10). Factor analysis of her Agitation Inventory yielded three factors: aggressive behavior, physically non-aggressive behavior, and verbally agitated behavior (30). However, these three categories of agitation are limited because they do not take into consideration the context in which the behavior occurs. Context is important because the same behavior can have different meanings depending on the context, and the strategy for management of a behavior should take context into consideration. For instance, negative vocalization by an individual not engaged in any activity may express an unmet need or psychological distress, while negative vocalization during assistance with an activity of daily living may express lack of effective communication between the individual and staff member. Considering behavior and context collectively drives different management approaches: identification and meeting of unmet needs in the first case, and better communication or procedure modification in the second.

Labeling the behavior “aggressive” assumes that this behavior is intentionally initiated by an individual with dementia. In most cases, however, individuals with dementia do not initiate aggressive behavior without provocation. For example, an observation study showed that “aggressive” behavior was most often directed towards staff usually in the context of personal care (31). In the majority of cases, aggression was preceded by verbal outbursts and resistance to caregiving activities. This resistance, or “resistiveness to care,” is caused by the patient’s belief (often delusional) that the care does not have to be provided or just not understanding the motivation and actions of the caregiver. Therefore, the patient defends himself or herself against the caregiver and, if the caregiver persists in efforts to provide unwanted care, the patient may become combative or strike out. However, in that situation, it is a mistake to label the patient “aggressive” because it is the caregiver whom the patient perceives to be the aggressor. Labeling the patient “aggressive” shifts the blame from the caregiver, who may be using inappropriate approach or ineffective communication, to the individual with dementia and “blames the victim.”

Therefore, it is useful to differentiate between agitation and resistiveness to care. Use of the term “agitation” should be limited to a situation outside of caregiving activity. Agitation can be defined as those behaviors that communicate to others that the person with dementia is experiencing an unpleasant state of excitement and are observable without subjective interpretation, are not strictly behaviors that are invoked by caregiving activities, are unrelated to known physical needs of the patient that can be remedied, and are without known motivational intent (32). Therefore, before labeling any behavior as agitation, physical and environmental causes of the behavior should be eliminated. These causes include untreated pain, hunger, thirst, inappropriate environmental temperature, noise, and so forth. Agitation should be treated according to the primary consequence(s) of dementia (see below) that is/are the actual cause of agitated behaviors. Responses to treatment can be measured by a direct observation (32).

Resistiveness to Care

As described above, resistiveness to care occurs when an individual with dementia interferes with a caregiver...
attempts to provide care. Resistiveness to care is defined as the repertoire of behaviors with which persons with dementia withstand or oppose the efforts of a caregiver, and can be measured by a direct observation during care (33).

Strategies useful for managing resistiveness to care include effective communication and gentle and individualized caregiver approaches, postponing the intervention, and patient distraction. Relaxation before care reduced resistiveness during teeth cleaning (34) and reminiscence decreased the stress associated with bathing (35). Modification of a procedure according to patient preferences may also decrease resistiveness to care. For instance, letting individuals who are not “morning persons” sleep late may decrease their resistiveness to morning care. Another strategy is to provide care in a familiar-looking and “dementia-friendly” environment. Resistiveness during bathing may be decreased by making institutional bathrooms more home-like and by switching from bathing by shower or in a bathtub, which requires lifts, immersions, or cold bathrooms, to a gentle bed bath (36). Oral care and shaving can be provided in a “barbershop” setting (37). Improving certified nursing assistants’ behavior management skills resulted in decreased “agitation during care routines” (defined here as resistiveness to care) that persisted beyond the training program (38).

**Sundowning**

Sundowning is another poorly defined term. While most clinicians consider sundowning to be the escalation of behavioral symptoms in the afternoon and evening, others include agitation occurring during the night (39). Although the existence of sundowning is questioned by some (40,41), others reported that sundowning occurs in 12%–28% of individuals with dementia (42). Sundowning can be defined as the appearance or exacerbation of behavioral disturbances associated with the afternoon and/or evening hours. Sundowning may consist of increased motor or verbal activity (agitation) but may also increase resistiveness to care.

Sundowning may be caused by several factors. These factors may include environmental influences, such as change of caregivers in an institution. Sundowning could be explained by the Progressively Lowered Stress Threshold model that postulates that individuals with dementia become progressively more stressed during the day and are more likely to engage in a dysfunctional behavior in the evening (43) (see below). According to this theory, sundowning could be decreased by imposing rest and relaxation that would reset the stress threshold, an intervention that sounds plausible but was never experimentally tested.

There also may be a biological basis for the sundowning phenomenon. Sundowning is more severe in individuals who have delayed circadian cycle of body temperature (44). Thus, sundowning can be seen as resulting from a mismatch between the biological rhythms of the body and the environment. Sundowning may be different from delirium, which usually has well-defined physical causes and does not exhibit circadian variability. It remains to be established whether shifting of the circadian cycle of body temperature would decrease sundowning.

**Conceptual Frameworks for Behavioral Symptoms of Dementia**

Several general guidelines derived from evidence-based literature reviews have been published to facilitate application of research findings to improve the management of behavioral symptoms of dementia (45–47). However, while most of these guidelines are comprehensive, their breadth and length do not facilitate their direct use for the education of frontline caregivers.

Conceptual frameworks are helpful for caregivers because they provide guidance for detecting the cause(s) of behavioral symptoms, understanding the meanings of behaviors, and directing actions to manage behaviors. Thus, conceptual frameworks facilitate education of caregivers who manage behavioral symptoms of dementia. Conceptual frameworks also help the research community to conduct research in which multiple studies build upon one another to provide convincing bodies of evidence. Related studies developed from the same conceptual framework also facilitate the use of standardized scales for making central variables operational, thus allowing comparison across studies, a benefit for consumers of research.

Several frameworks guiding the management of behavioral symptoms of dementia stress nonpharmacological management and were developed by nurses or psychologists. Three of these models will be presented here and others were reviewed elsewhere (34). Pharmacological management is complicated by the difficulty of making a psychiatric diagnosis in an individual with significant communication impairment and comprehension difficulties. One model, using psychobehavioral metaphors, has been developed to overcome this difficulty (48). We review 4 behavioral models, the psychiatric model, and conclude by presenting a comprehensive and contextual model that proposes a hierarchy of behavioral symptoms of dementia, which integrates both nonpharmacological and pharmacological interventions (49).

**Behavioral Models**

Most behavioral models (Table 1) were developed by nursing investigators. This is not surprising considering that nursing staff (often certified nursing assistants working under the direction of a licensed nurse) deal with the need to manage behavioral symptoms of dementia on a daily basis.

**Need-Driven Dementia-Compromised Behavior Model.—**
The Need-Driven Dementia-Compromised Behavior (NDB) model views behavioral symptoms of dementia from the perspective of the person with dementia. Instead of considering behavioral symptoms “disturbing,” the NDB postulates that the behaviors stem from a need or goal of the individual with dementia (50). The behaviors are influenced by background factors such as neurological factors (regional central nervous system damage, neurotransmitter deficits, circadian rhythm deterioration, motor ability), cognitive factors (attention, memory, visuospatial ability, language skills), health status (general health, functional ability, affective state), and psychosocial factors (demographics, personality type, history of psychosocial stress, behavioral
response to stress). The immediate cause of these dementia-compromised behaviors are proximal factors such as personal variables (emotions, physiological needs, functional performance), physical environment (light, noise, temperature), and social environment (ward ambience, staff stability, staff mix).

The NDB model recognizes that it is difficult to influence background factors, e.g., it is not possible currently to reverse basic pathological processes causing brain damage, but that proximal factors, e.g., assistance with performing activities of daily living, are more amenable to modification. Ideally, the modifications should be customized according to individual needs and goals. For instance, activities could be modified according to the degree of Extraversion and Openness present in an individual with dementia (51). The NDB model recognizes that behavioral symptoms are often precipitated by a lack of meaningful activity (52), and also considers a passive behavior as expression of a need (53). Because it is often impossible to determine an individual’s needs and goals in advanced dementia, often the interventions consist of generic improvement of the environment (54). The NDB model also considers aggression during bathing as one of the NDB behaviors without recognizing the importance of a caregiver’s behavior in escalation of resistiveness into combativeness (55).

**Progressively Lowered Stress Threshold Model**—The Progressively Lowered Stress Threshold (PLST) model divides behavioral symptoms of dementia into 4 groups: (a) cognitive or intellectual losses (memory, abstraction, judgment, aphasia, comprehension of visual and auditory stimuli), (b) affective or personality changes (diminished inhibitions, decreased attention span, antisocial behavior, delusions, and hallucinations), (c) conative or planning losses (inability to organize and complete a task, functional losses, apraxia, frustration, and helplessness), and (d) PLST (43,56).

A low stress threshold is postulated to cause catastrophic behaviors, confused or agitated night awakening, purposeful wandering, violent, agitated, or anxious behavior (belligerence), noisy behavior, purposeless behavior, compulsive repetitive behavior, and other cognitively and socially inaccessible behaviors. The PLST model identifies 5 stressors that participate in invoking these behaviors: (a) fatigue, (b) change in environment, routine, or caregiver, (c) misleading stimuli or inappropriate stimulus levels, (d) demands that exceed functional ability, and (e) physical stressors (pain, discomfort, acute illness, depression).

The main assumption of the PLST model, that the stress threshold is progressively lowered with the progression of dementia, was never tested. According to the PLST model, daytime rests and napping could prevent some behavioral symptoms of dementia. Although there are no specific randomized control studies to support this hypothesis, some indirect evidence supports decreased behavioral symptoms secondary to reduces stress or relaxation. It was reported that agitated behaviors decrease after an episode of sleep (57), and a period of relaxation decreased resistiveness during a dental procedure (34). On the other hand, a randomized study investigating the effect of exercise on sleep reported that frequent episodes of exercise, which limited daytime napping, significantly decreased the prevalence of agitation (58). This study provided physical exercise sessions every 2 hours from 8:00 AM to 4:00 PM and observed residents every 15 minutes. The amount of day time spent in bed was decreased in the experimental group from 42% of observations to 28%, but it could be argued that even this shorter time was enough to reset the stress threshold.

The PLST model was used successfully in several trials investigating the effect of caregiver education on consequences of caregiving. PLST-based training improved caregivers’ mood (59), decreased impact of caregiving (60), and

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<tr>
<th>Model</th>
<th>Principles</th>
<th>References</th>
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<td>Need-Driven Dementia-Compromised Behavior (NDB)</td>
<td>Behavioral problems are related to unmet needs and caused by interaction between stable factors and traits (personality, coping style, disease-related losses) and fluctuating environmental factors (personal, social, physical). Stable factors and traits are not going to change, and the disease will progress, but it is possible to modify environmental factors both to promote function and prevent behavioral problems.</td>
<td>Algase et al., 1996</td>
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<td>Progressively Lowered Stress Threshold (PLST)</td>
<td>Behavioral problems results from excess environmental stress. The stress threshold is lower in dementia, and behavior is caused by anxiety, which increases to cause dysfunctional behavior. Stress is caused by fatigue, multiple competing stimuli, physical conditions (illness, hunger, thirst), changes in caregiver, routine, and environment, demands that exceed abilities, and negative and restrictive feedback. Stress can be managed by reducing environmental stress and by modifying routines and approaches.</td>
<td>Hall et al., 1987</td>
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<td>Antecedent-Behavior-Consequences (ABC)</td>
<td>Behavior is determined by a specific antecedent—a stimulus that triggers the behavior—and can be prevented by eliminating the antecedent. Behavior needs to be described and its consequences identified. Intervention should take into consideration who is affected by the behavior and attempt to eliminate only those behaviors that are harmful for the person with dementia or others.</td>
<td>Smith, 2003</td>
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<td>Habilitation approach</td>
<td>Modify environment to maximize function; use effective communication strategies, validate emotions; use functional assistance to decrease disability; maintain social skill as long as possible by practice; provide cues to decrease confusion; enter their reality, never say “no,” delay, distract when behavior problems seem imminent.</td>
<td>Raia, 1999</td>
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improved T-cell immune function (61). In these studies, however, PLST training was compared with a usual-care group and, therefore, it is possible that an alternative intervention using a different model could have been equally effective. For example, in a controlled clinical trial, another team found that regular moderate-intensity exercise reduced stress-induced cardiovascular reactivity and improved sleep quality in caregivers of individuals with dementia (62).

**Antecedent-Behavior-Consequence Model.**—This model is often used for education of dementia caregivers (63). Using computerized searches of published literature, we could not find any research reporting on the application of this model to dementia care practice and its effectiveness.

The Antecedent-Behavior-Consequence (ABC) model instructs caregivers to identify antecedents of a specific behavior as well as clearly define behavior’s consequences. The model postulates that the behavior could be prevented by removing the precipitating antecedents, e.g., preventing resistiveness to care caused by pain during daily care by administration of analgesics. The ABC model also stresses the need to evaluate each behavior to assess how often it happens, how long it lasts, and how dangerous it is, and document the occurrence. The model also instructs caregivers to analyze the consequences of the behavior to determine who is affected by it. Some behaviors, e.g., pacing, may be considered a problem but may actually not be a problem for the patient, just for other residents on the unit and staff. In fact, pacing may be actually beneficial for the individual with dementia because it provides physical exercise and meaningful activity. If this is the case, the appropriate strategy may not be prevention of this behavior but modification of the environment to allow safe pacing without interference with other residents.

Following the ABC model approach, caregivers should identify specific antecedents to be modified. In a clinical trial with nursing home residents with dementia, two standardized interventions improved affect but did not reduce disruptive behaviors (64). The implication of these results is that global interventions are not as effective as individualized interventions that address the specific behavioral triggers for an individual person and thus indirectly support the ABC model.

**Habilitation Approach.**—The aims of the habilitation approach are to maximize functional independence and morale of individuals with dementia (65). The habilitation approach also promotes elimination or attenuation of behavioral symptoms of dementia, attempts to elicit positive emotion, and to maintain positive emotional state during the day. Although persons with dementia might have lost their insight into what triggered a particular emotion or how to control emotions or behaviors, the capacity to feel and exhibit emotions persists despite cognitive impairment.

Habilitation can be defined as a proactive and caregiver-controlled environmental therapy that addresses 6 domains in which positive emotions can be created and maintained: (a) physical environment, (b) communication, (c) functional assistance, (d) social, (e) perceptual, and (f) behavioral. The physical environment should compensate for diminished cognition without increasing the person’s awareness of deficits while promoting greater mastery of the environment, e.g., to provide limited choices of clothing to facilitate dressing. Communication strategies should enhance a person’s capacity to understand language as well as to make himself or herself better understood by increased use of body language, demonstrations, modeling, and pictures. Functional assistance should be directed to reduce disability and promote greater perception of independence, e.g., by modification of the environment, clothing, or activities.

To make the social domain operational, caregivers should strive for maintenance of cognitive and social skills for as long as possible by promoting skill practice during activities that are commensurate with the person’s cognitive level. The perceptual domain makes sensory cues more easily perceived to decrease confusion. The behavioral domain is based on the acceptance that caregivers cannot change the person’s behavior directly, but can change the behavior indirectly by altering either their approach technique or the person’s physical environment. The habilitation approach eliminates reasoning attempts with a person who has lost the capacity to reason, and replaces the word “no” with distraction and elimination of triggering events. The habilitation approach is more a philosophical approach or way of thinking than an actual model, but application of habilitation concepts is helpful for family and professional caregivers in dealing with behavioral symptoms of dementia.

**Psychiatric Model**

In many cases, behavioral approaches alone are insufficient to effectively treat or alleviate behavioral symptoms of dementia. In these situations, multimodal treatment that includes the use of psychoactive agents may be required. This is especially true when the behavioral symptoms are so severe that they threaten the safety of the individual with dementia or others. Emergency medications often include antipsychotics or benzodiazepines. Antipsychotics are considered the standard of care for the treatment of agitation and psychosis in dementia when behavioral and environmental manipulations fail, and antidepressants are considered effective for depression in patients with dementia (47).

Making a standard psychiatric diagnosis is often impossible because the person’s language and comprehension impairment precludes a comprehensive and standardized evaluation. The psychiatric model attempts to overcome this problem and compensates for deficits by using psychobehavioral metaphors instead of a specific diagnosis (48). A metaphor is derived by evaluating an individual’s behavioral symptoms and clustering the most important signs and symptoms into a pattern that is roughly analogous to a drug-responsive syndrome.

Metaphors include depressive, manic, anxious, psychotic, and nonspecific features. Thus symptoms of an agitated patient who is withdrawn, negativistic, irritable, and dysphoric can be considered a metaphor of depression that may respond to an antidepressant. Similarly, presence of poorly articulated fears and inappropriate accusation could be considered a metaphor of psychosis that provides a logical basis for the use of antipsychotics. The psychiatric model recommends selecting a medication class that is relevant to...
the psychobehavioral metaphor with the highest likelihood of tolerability and safety (Table 2). The least toxic and safest medication should be used following a standard geriatric principle of “start low and go slow.”

**Comprehensive Model**

The comprehensive and contextual model described below integrates behavioral and psychiatric approaches to the assessment and management of behavioral symptoms of dementia. This model postulates a hierarchy of causes of behavioral symptoms (Figure 1). At the core is the dementing process itself. However, manifestation of pathological processes are modified by the underlying personality of the individual. Although dementia may lead to some personality changes (66), the underlying personality remains expressed until late stages of the dementia and often becomes more pronounced because dementia decreases inhibitory effects of higher cortical functions. Primary consequences of dementia are functional impairment, mood disorders, and delusions and hallucinations. These primary consequences, in combination or alone, lead to secondary consequences: inability to initiate meaningful activities, dependence in activities of daily living, spatial disorientation and anxiety. Primary and secondary consequences of dementia cause peripheral symptoms. A mistake is often made by treating peripheral symptoms, e.g., agitation or insomnia, in isolation without identifying and treating the primary cause(s).

Functional impairment causes an inability to initiate meaningful activities, dependence in activities of daily living, spatial disorientation, and can also lead to anxiety if the individuals with dementia are challenged to perform activities that they are no longer capable of doing. Lack of meaningful activities during the day may cause several peripheral symptoms: agitation, repetitive vocalization, insomnia, and apathy. Therefore, providing sufficient meaningful activities appropriate for the functional abilities of the individual should be the first step in management of behavioral symptoms of dementia. Meaningful activities are best provided as continuous activity programming that has been shown to significantly decrease the use of psychoactive medications (37).

Mood disorders include depressive and manic states. Depression is very common in community-dwelling individuals with dementia (67) and should be considered even in individuals with advanced dementia. Depression can cause or aggravate the inability to initiate meaningful activity and dependence in activities of daily living, and often has an anxiety component. These secondary consequences may lead to several peripheral symptoms, such as apathy, agitation, food refusal, and repetitive vocalization. Depression may also aggravate resistiveness to care because depressed individuals ignore activities of daily living. Depression also increases the propensity for escalation of resistiveness into combativeness because even cognitively intact depressed individuals are angry and do not tolerate others (68). Depression was significantly more common among residents with dementia who manifested physical or verbal aggression than in those without such behaviors (69). Depressive symptomatology may be improved by providing sufficient meaningful activities, but often requires treatment with antidepressants. Manic symptomatology is less common but can be a significant cause of agitation. Manic symptoms may also lead to interference with other residents, e.g., unwelcome sexual advances, and are best treated with mood stabilizers.

Hallucinations are more common in dementia with Lewy bodies than in Alzheimer’s disease but delusions are quite common in both conditions. Hallucinations and delusions lead to spatial disorientation, anxiety, and dependence in activities of daily living when individuals do not recognize that they need essential daily care activities. This lack of recognition is also the major cause of resistiveness to care that may escalate into combativeness. Other peripheral symptoms that may be caused by hallucinations and delusions are food refusal (if an individual believes that the food is poisoned), elopement, interference with other residents who may be mistaken for the patient’s relatives or employees, and repetitive vocalization. Hallucinations and delusions often respond well to low-dose antipsychotic medications.

Behavioral symptoms of dementia are influenced by four environmental factors. Caregiving approaches are most important for the resistiveness to combativeness continuum. Many individuals with dementia do not have problem behaviors when they are left alone, but when caregivers attempt to provide routine care, the individual with dementia

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**Table 2. Psychobehavioral Metaphors of Behavioral Symptoms of Dementia**

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<tr>
<th>Metaphor</th>
<th>Medications</th>
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<tr>
<td>Depressive features</td>
<td>Antidepressants, anticonvulsants</td>
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<td>Manic features</td>
<td>Anticonvulsants</td>
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<tr>
<td>Anxious features</td>
<td>Antidepressants, anticonvulsants, anxiolytics</td>
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<td>Psychotic features</td>
<td>Antipsychotics</td>
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<tr>
<td>Nonspecific</td>
<td>Empirical trials of appropriate agents</td>
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*Note: From Tariot et al., 1999 (ref. 48).*
resists the caregiving attempts because he or she does not understand the need. If the caregiver insists, the patient may defend him or herself, become combative, and even strike out. Therefore, it is very important to avoid this escalation by delaying the care or by distracting the individual. Resistance may also be greatly diminished by modification of a nursing procedure, e.g., by substituting a bed bath for a shower bath (36).

The social environment is important because it is easier to provide care for individuals with dementia on a Dementia Special Care Unit (DSCU) that in a mixed nursing home population (70). Individuals with dementia may unintentionally interfere with cognitively intact residents by entering their rooms, rummaging through their possessions, and by physical contact. These problems are largely eliminated in a homogenous population of individuals with dementia who interact with each other on a similar level.

A DSCU may also provide an appropriate physical environment that eliminates elopement and allows safe wandering. The environment would provide sufficient stimulation but would contain only objects that can be safely handled by the individuals with dementia. The Eden Alternative, which creates a home-like environment, was proposed to improve quality of life of nursing home residents (71). A recent evaluation did not find beneficial effects of this intervention in terms of cognition, functional status, survival, infection rate, or cost of care after 1 year (72). Although quality of life was not directly measured, qualitative observations indicated that the change to a home-like environment was positive for many staff members as well as residents. The Eden Alternative introduces pets into the nursing home environment; animal-assisted therapy was shown to decrease loneliness in residents of long-term care facilities in another study (73).

Medical interventions are the fourth important environmental influence on behavioral symptoms of dementia. Individuals with dementia may not understand the reason for medical procedures and, therefore, even the most routine procedure, e.g., blood drawing, may lead to resistance and possibly to a catastrophic reaction. Therefore, it is important to weigh carefully the burdens and benefits of any medical intervention. The decisions regarding which strategy is used for managing medical problems should be based on clearly defined goals of care (74). The procedures that may not be indicated in advanced dementia include cardiopulmonary resuscitation, transfer to an acute medical setting, tube feeding, and antibiotic treatment of systemic infections (75). As dementia progresses, it may become appropriate to include individuals with dementia in a hospice program (76,77), however, several barriers exist that make provision of appropriate end-of-life care for individuals with dementia difficult (78). Hospice approach to care in advanced dementia provides more comfort than traditional long-term care at lower cost (79), avoids ineffective use of antibiotics (80) that are not necessary to maintain comfort (81), and avoids use of tube feeding (82,83).

Conclusions
Behavioral symptoms of dementia are often misunderstood by caregivers who lack experience with these behaviors and insight into their causes. Some individuals are successful in covering up their cognitive deficits while developing behaviors that are caused by the dementing process. Many caregivers err by considering these behaviors willful and attempt to reason with the individual instead of recognizing that a different approach has to be used. Models of behavioral symptoms of dementia provide conceptual frameworks that guide caregivers in their efforts to help patients and to deal with these symptoms by developing successful management strategies. Appropriate management of behavioral symptoms in dementia is as important for quality of life of individuals with dementia as management of pain in individuals with cancer.

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