Evidence Rocks in Long-term Care, But Does It Roll?

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This article reviews the problems with the implementation of evidence-based care in long-term care. It highlights the fact that many common practices are incompatible with evidence and that available evidence, including evidence about inadvisable and ineffective treatments, is often not followed. Often, there is a tendency to follow recommendations for younger persons (for example, the management of hypertension and elevated cholesterol), or to use questionable interventions (for example, choices for treating constipation). In many cases, the treatments used have only marginal efficacy and increased potential for side effects. This article makes recommendations for improving the approach to evidence-based care in long-term care and strongly urges the FDA to require drug studies in nursing homes. **(J Am Med Dir Assoc 2007; 8: 493–501)**

Keywords: Nursing home; quality improvement; evidence-based care; best practices; cholesterol; hypertension; constipation; Alzheimer's disease

Much has been written about the attributes and deficits of contemporary long-term care. There are many projects and initiatives to try to improve long-term care, including industry-driven campaigns, pay-for-performance, quality measures, the survey process and related enforcement, ombudsmen and consumer advocates, and individual state legislation and regulations.

In some ways, nursing home care is much better than it was 2 decades ago, when the Institute of Medicine issued its report that led to the OBRA '87 law and subsequent regulations.[1] For example, there is less use of restraints, fewer serious nutritional issues, and more attention to quality of life.[2] But—as with other settings—some of the care still needs much improvement and some of it is very problematic.[3–6]

While making progress in addressing basic care problems that were identified several decades ago, nursing homes have also had to confront many new challenges and concerns. These include rising public expectations, a more complex population, vastly more treatment options (including a proliferation of medications) compared to 20 years ago, and the challenges of finding competent staff and available practitioners.[7]

Physician availability, and the caliber of physician practice in nursing homes is variable and often problematic.[8,9] For various reasons, nursing homes often exert considerable pressure to institute medical interventions as quickly as possible to treat diverse common symptoms such as pain and weight loss. In contrast, physicians may not request or receive information about the patient quickly enough or in enough detail to permit correct diagnosis and implementation of potentially helpful interventions.

A major component of many initiatives to try to improve nursing home care (for example, those involving the nation's Quality Improvement Organizations or QIOs) involves the promotion and sharing of so-called "best practices."[10] Various definitions of the term include " . . . the best possible way of doing something . . . commonly used in the fields of business management, software engineering, and medicine, and increasingly in government," "processes and activities that have been shown in practice to be the most effective," and "programs, initiatives or activities which are considered leading edge, or exceptional models for others to follow."[11]

But what are these "best practices"? Are "best practices" actually implemented? Are they evidence or tradition based? How do providers and practitioners decide what "evidence" to trust and use? Do these "best practices" reflect essential care principles or are they primarily about popular interventions for specific conditions and risks?

There are various approaches to applying "evidence" in long-term care. So-called "evidence-based" guidelines and protocols vary in the extent to which they cover all relevant aspects of a topic or a more limited portion such as assessment and interventions.[12] Other sources note that much of the

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Presented at the American Medical Directors Association Annual Meeting, Hollywood, FL, 2007.

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DOI: 10.1016/j.jamda.2007.07.003

evidence about care of various conditions in the elderly is based on research done in a younger population. There is a paucity of studies in persons older than 70, let alone in the old-old. Even more so, very few randomized, placebo-controlled studies are conducted in long-term care. Therefore, it is unclear whether and to what extent these approaches apply in the long-term care population. Another vital, yet often overlooked, category of evidence is what we should *not* do in various situations. In this regard, we may have a lot more useful evidence than we think.

In addition, there are diverse influences on how nursing home staff and practitioners select, interpret, and apply evidence. Examples of these influences include knowledge of geriatric principles, understanding how to interpret patient condition and prognosis, and concerns about avoiding regulatory citations.

THE PRACTITIONER'S DILEMMA

It is challenging for physicians to try to follow all of the advice about so-called evidence-based care. For example, one study identified that trying to care for individuals with multiple comorbidities (who constitute much of the nursing home population) by following the advice in guidelines that focus on managing a single condition may result in a complicated, costly regimen including mutually incompatible or problematic approaches that actually diminish the quality of care.[13,14]

Practitioners get a lot of advice, ranging from conservative to aggressive, about what they are—or should be—doing for elderly patients.[15] Countless studies suggest that many conditions (pain, osteoporosis, depression, hypertension, and so forth) are undertreated and should be identified and managed more aggressively,[16,17] while others suggest that many treatments are overused or improperly used,[18,19] thereby causing additional preventable complications. There are many challenges to getting physicians to examine and respond to evidence.

For example, aggressive treatment of hypertension is widely advocated,[20] but overly aggressive treatment in frail older individuals may not affect the outcome positively and can cause debilitating complications.[21,22] This is discussed in detail later in this article.

There is considerable pressure to identify and treat depression aggressively.[23] But do almost half of all nursing home residents in the United States really need to be on antidepressants, even considering that these medications can be used to treat conditions other than depression?[24] In addition, excessive or prolonged treatment can cause significant complications, such as falling and serotonin syndrome.[25]

Aggressive treatment of anemia has been widely advocated, as well.[26] Erythropoietin has been used increasingly for diverse off-label applications. But recent reports of severe complications have led to "black box" warnings about the risks of its excessive use and the need to carefully monitor hemoglobin levels.[27] Increasingly, it is suggested that routinely trying to normalize hemoglobin carries unacceptable risks,[28,29] although this is controversial.[30]

There has been considerable discussion about undertreatment of pain[31] as well as widespread political and clinical advocacy of aggressive pain management.[32] The benefits of analgesics are often emphasized, and the risks are often downplayed. But almost every category of analgesic can cause serious complications, including death. For example, the risks of addiction to Oxycontin have been identified as being substantially greater than the manufacturer has advised.[33]

Prescribing restricted diets to address specific conditions is often not helpful, and may increase the risk of nutritional deficits.[34] Despite advice to treat hyperlipidemia aggressively, doing so may not matter much in those over age 80.[35]

So, it is pertinent to consider how nursing homes and practitioners should deal with so much often contradictory and questionable advice. Perhaps we are in too much of a hurry to intervene and treat when instead we should retreat. Maybe we are pushed to try to do too much with too little. Perhaps there are a few key things that matter substantially and many things that matter very little. Perhaps, most of all, evidence is most beneficial when applied in the proper clinical context; ie, by considering the entire patient situation, not just the symptom, risk, or involved organ system.

KEY EVIDENCE

Modern medicine is based on some key evidence-based concepts. For one, the body functions effectively because all organ systems (cardiovascular, nervous, and so forth) operate together to maintain many critical balances (the concept of homeostasis).[36] Disruption of these balances by illness or dysfunction may challenge the body's ability to adapt to additional stresses, such as new illness or the worsening of existing conditions.

Furthermore, our management of symptoms and diseases involving one organ or body system often affects and is affected by other organs and body systems. For example, a patient whose hypertension is treated too aggressively may be unable to attain a high enough blood pressure when standing up (orthostatic hypotension) or to respond effectively in case of bleeding or sepsis. Similarly, trying to treat urinary incontinence or behavioral symptoms may disrupt the delicate balances in a complex impaired individual, causing confusion, dizziness, or gastrointestinal dysfunction.

Many frail elderly individuals have irreversible abnormalities of half or more of the body's organ systems. It is common for them to have syndromes (symptom complexes such as anorexia or altered mental function and behavior) that involve several different organs and a cascade of events. The presenting symptom is not necessarily the root cause.[37]

Thus, there is overwhelming evidence that all symptoms must be considered and addressed in the proper context, and not as isolated events involving just one organ system. The whole is always greater than the sum of the individual parts.

BEST PRACTICES FALLACIES

Nursing homes often have protocols to address symptoms and conditions such as falls, pain, weight loss, and behavior. The responsibility to develop and implement these various protocols is often given to specific disciplines; for example, therapists may oversee fall management, dietitians oversee weight loss issues, and psychiatric consultants oversee behavior management. Many nursing home "best practices" empha-

size rapid symptom identification and standardized interventions. That is, call in the dietitian, therapists, psychiatrist, etc. as quickly as possible, and follow their advice to the letter.

But symptoms can have many causes. One condition may cause several symptoms, and a given symptom may have multiple causes. For example, someone could have a single cause of delirium, falling, behavior issues, and anorexia. And, delirium could have multiple coexisting causes including infection, fluid and electrolyte imbalance, and medication adverse consequences.

Similarly, it has been recognized that "Appropriate use of rehabilitation necessitates a clear understanding of the causes of disability . . . . Diseases and impairments often interact to cause disability in older persons . . . . The rehabilitation plan should be guided by the nature of the disability and by the pathological conditions underlying the disability . . . . "[38(p1371)] The four basic steps to disability assessment are: "(1) characterize the disabilities; (2) identify the causal impairments; (3) determine the specific diseases underlying the identified causal impairments; (4) discover any contributing factors."[38(p1374)] But, many nursing homes view "rehabilitation patients" as a totally separate and distinct category from other patients, pay little attention to underlying causes, and provide care that is inconsistent with the evidence.

Thus, an evidence-based approach to nursing home care necessarily involves careful consideration of underlying causes and their consequences, as well as carefully detailed symptom descriptions. In contrast, rendering care based on superficial symptom description, or without consideration of root causes, is incompatible with the evidence. The evidence strongly suggests that we need more—not less—involvement from those who can evaluate the risks and benefits of specific interventions by looking at the whole patient, not just more consultants to deal with pieces of the patient. Also, as with the guideline study by Boyd et al[13] cited above, addressing issues in isolation may simply lead to complex incompatible or irrelevant regimens that cause significant complications.

Relevant treatment in the proper context is consistent with the evidence, while across-the-board or "cookbook" treatment for all individuals (for example, restricting food and fluid for anyone who has an abnormal swallowing study, or giving an antidepressant to everyone who triggers on the Minimum Data Set [MDS] for possible symptoms of depression) is not consistent. Because many treatments have either anticipated or unexpected effects and complications, careful monitoring of both the effects and complications of treatments, and recognition of remote complications (those that affect organ systems other than the one being treated) are also most consistent with evidence.

CARE PROCESS AND EVIDENCE

Clinical protocols and guidelines may approach evidence in several ways. One consideration is the evidence basis of their recommendations; for example, about whether and how to test and treat. Another is the degree to which they adhere to the evidence about following key care process steps.

Some clinical protocols and practice guidelines, such as those of the American Medical Directors Association (AMDA), incorporate all of the critical care process steps, including recognition and problem definition, assessment and cause identification, management, and monitoring. They emphasize making clinical decisions by following processes of care.

Since everything in the body works together, it is essential to base treatment decisions on information in the proper context, considering how a condition affects the rest of the person and how the rest of the person affects that condition. Using protocols that cover the whole care process is more compatible with the evidence. But many nursing home staff, and many of the consultants who guide them, prefer short, simplified protocols that cover only some parts of the care process, such as assessment and care planning. This latter approach is less consistent with the evidence.

Some nursing homes use few consistent protocols, and others depend heavily on federal survey guidance or required instruments such as the MDS to guide their care decisions. However, despite its widespread use and support, the MDS has significant limitations as a valid clinical and quality improvement instrument.[39] While guesswork is invariably sometimes part of caring for frail, impaired individuals, evidence-based approaches are much more likely to support good quality care, even when there is uncertainty.

PRACTICES AND EVIDENCE

While some practices in nursing homes are compatible with evidence, many others are not. Often negative evidence available in older persons is ignored in favor of positive evidence in young persons. In essence, despite the evidence, we often treat. In this section, we will first review examples where physicians often continue to provide treatment despite negative studies in older persons.

Constipation, or the perception of constipation, is a major problem among older persons.[40] Between 25% and 50% of persons in nursing homes receive laxatives, and admission orders commonly include an order for a laxative.[41,42] The most commonly prescribed laxatives are the stool softeners, diocytyl sodium and calcium sulfosuccinate (Colace and Periocolace).[43] There is, however, no evidence that these agents have any efficacy.[44,45] In addition, they may very rarely cause lipoid pneumonia. There is much better evidence for the role of osmotic laxatives, particularly in higher doses.[40,46] Most recently, lubiprostone, in studies involving over 1000 persons, has been demonstrated to increase the number of bowel motions, improve stool consistency, decrease bloating, and improve the global assessment of constipation severity.[40,47,48] Despite the evidence, Colace remains on formularies in both hospitals and nursing homes.

Physical restraints have been shown to be associated with an increase in fractures.[49] It is clear that physical restraints cause more harm than good.[50–52] Despite this, physical restraints continue to be used. In this regard it is perhaps useful to remember that a Foley catheter is a 1-point restraint[53] and its use is associated with an increase in urinary tract infections.[54]

Therapeutic diets continue to be widely used in nursing homes despite the paucity of evidence for their efficacy and the evidence that they may lead to weight loss.[55–58] As an

example, there is good evidence that American Diabetic Association diets are not efficacious in controlling glucose or HbA_1C levels in nursing home residents.[59–61] Both the American Diabetic Association and the American Dietetic Association do not recommend the use of these diets in long-term care.[62,63]

Dietitians commonly recommend vitamin C and zinc for individuals with wounds, allegedly to aid wound healing. However, there is no compelling evidence to support this practice routinely, in the absence of specific deficiencies. Iron sulfate is often given 3 times a day, yet a recent study showed that iron gluconate given once a day was as effective in restoring iron levels.[64] Additionally, excessive iron sulfate doses can cause marked constipation and nausea, which can lead to anorexia and its subsequent complications.

Much of the current practice regarding urine and urinary tract infections (UTIs) is folklore-based, not evidence-based. Bacteriuria is very common in long-term care residents. While it is not normal, it is only sometimes problematic. Bacteriuria alone does not materially affect long-term care patient survival. The literature has long identified that bacteriuria is different from a urinary tract infection. In individuals with nonspecific symptoms, bacteriuria is often coincidental, not causative.[65] Furthermore, while urosepsis may result in delirium manifest as restlessness or alternating lethargy and agitation, UTIs are not associated with verbal and physical aggression.[66]

Acute deterioration in stable chronic urinary symptoms may indicate acute infection. But, foul-smelling or cloudy urine and new onset of nonspecific symptoms (eg, altered mental status, decreased appetite), especially in the absence of acute symptoms referable to the genitourinary tract, are generally unreliable indicators of UTI. Urine cultures alone are not enough to establish a diagnosis of UTI. Instead, the whole patient picture, including the patient's condition, comorbidities, and results of the urinalysis, must be considered.[67]

There is good evidence that antimicrobial therapy in asymptomatic individuals "... does not decrease the frequency of symptomatic infection, alter chronic symptoms such as urinary incontinence, nor alter long-term outcomes, including death."[68 (p171)] Bacteriuria may still be present after a UTI is treated, but "post-therapy urine cultures are not recommended as a test of cure and should not be obtained unless symptoms have persisted or recurred."[68]

However, it is common practice in nursing homes for nurses and others to attribute countless symptoms to urinary abnormalities and to request, react to, and ask physicians to order treatment based on urine cultures. In addition, physicians often prescribe antibiotics, order repeat cultures, and repeatedly treat individuals with asymptomatic bacteriuria. All of this exposes patients to the complications of antibiotics and often misleads the staff and practitioner to miss the correct underlying cause of such symptoms.

While debatable, the use of drugs to treat dementia in nursing home residents is questionable.[69–72] A meta-analysis suggested that there were 9% more global responders to cholesterol ester inhibitors and an 8% higher adverse event rate.[73] With memantine, the Cochrane database reported improved behavior (2.76 points on a scale of 144), improved activities of daily living (ADLs) (1.27/54), and decreased agitation (8% versus 12% in controls).[74] Results with nootropics, which are much cheaper, are not substantially different from these agents.[75]

In nursing homes, it is common to approach problematic behavior or mood disturbances by ordering a psychiatric consultation, requesting medication interventions, or quickly transferring individuals to the emergency room. But the evidence is that behavior is a symptom with diverse underlying causes. For example, agitation (a very nonspecific symptom) could be due to many diverse causes including delirium, acute psychosis, medication adverse consequences, having pain, or needing assistance with something.[76,77] Recently, there has been increasing evidence that antipsychotics are not very effective at treating behavioral problems and have an unfavorable side-effect profile.[78,79] Evidence-based approaches to behavior management include careful symptom description and problem definition, thorough cause identification, and consideration of cause-specific interventions, including nonpharmacologic approaches where warranted. Yet, nursing homes often manage problematic behavior contrary to evidence, leading to poor results, unnecessary hospital transfers, or serious adverse consequences because of poorly chosen medications.

While some approaches to managing nutrition and hydration in nursing homes are consistent with evidence, much of it is not. For example, it is common practice to try to assess or monitor hydration status based on observations such as skin turgor, but physical findings are not very reliable indicators of hydration status.[80] Intake and output measurements are often inaccurate and not very helpful for clinical decision making. The basic metabolic profile (BMP) is a simple, useful screen for fluid and electrolyte balance that is often overlooked or misinterpreted. Many nursing home staff, as well as physicians in all settings, misunderstand the various forms of fluid and electrolyte imbalance and use the term "dehydration" incorrectly.[81] Similarly, while the evidence supports aggressively looking for treatable causes of weight loss, such as depression and medications, and appropriate use of supplements,[82–86] the evidence for the use of orexigenics[87–90] and tube feeding in demented persons[91,92] is much more limited.

Management of swallowing problems, including dysphagia, is another area where common nursing home practices tend to ignore evidence. In many nursing homes, the protocol is to immediately consult with a speech therapist for anyone who has difficulty eating, chewing, or swallowing, or coughs while they eat. Physicians and nurses rarely make any meaningful assessment of such symptoms, despite the potential differential diagnosis. Facilities commonly permit speech therapists to make major clinical decisions about whether or not someone should be allowed to eat and drink, while other staff and the practitioners essentially just acquiesce.

In a unique study, a speech therapist examined what nurses and speech therapists actually know about dysphagia and whether related practices in nursing homes are consistent with the evidence.[93] The study concluded that beliefs about dysphagia vary considerably and that practices in managing

swallowing issues in nursing homes are often incompatible with the evidence.

The study identified issues including inconsistent bedside assessment approaches, invalid interpretation of information, failures to manage the situation in the context of the entire patient, failures to properly consider alternative explanations for symptoms, failure to recognize important ethical and legal issues related to restricting the right to eat and drink, inconsistent use of interventions such as thickened liquids, and misunderstanding of evidence about the relationship between a swallowing problem, aspiration risk, and aspiration pneumonia. These findings are particularly disappointing in view of the emerging evidence on the appropriate use of bedside testing[94] to identify dysphagic treatments and the utility of drugs such as carbegoline[95] and angiotensin-converting enzyme (ACE) inhibitors[96] to treat dysphagia.

THE EVIDENCE AGAINST TREATING CHOLESTEROL AND HYPERTENSION IN LONG-TERM CARE

Epidemiological evidence has long failed to support aggressive management of cholesterol in older persons.[97] Some recent examples include the following:

- In older hospitalized patients low cholesterol increases mortality[98]
- Cholesterol following myocardial infarction fails to predict death for up to 6 years[99]
- Low total cholesterol predicts death in advanced heart failure[100]
- Low total cholesterol had a significant predictive effect in 71- to 93-year-olds of mortality in the Honolulu Heart Program.[101]

Some of these correlations of low cholesterol with mortality can be explained by the fact that cytokine excess, a major cause of frailty, lowers cholesterol.[102,103] In view of the failure of epidemiological studies to support cholesterol lowering in older persons, are there any intervention studies?

The PROSPER study was a placebo-controlled trial of 5804 persons 70 to 82 years of age.[104] The treatment was pravastatin (40 mg per day) with a 32-year follow-up. While mortality from coronary artery disease decreased by 24%, there was no change in total mortality. There was also no change in stroke incidence and no significant effect on cognitive function or disability. This would appear to be insufficient evidence to support risking the effects of polypharmacy with expensive drugs.[105,106] In addition, myopathic effects of statins appear more commonly in older persons.[107]

Most studies of blood pressure in persons between 70 and 80 years of age have demonstrated an advantage of lowering blood pressure to below 160 mm Hg, but not necessarily to below 140 mm Hg.[108] A meta-analysis of octogenarians treated to below 160 mm Hg showed that in double-blind trials the relative risk was increased to 1.14 ($P < .05$) in persons receiving treatment.[109] There was also no decrease in cardiovascular deaths. The HYVET-pilot study of 1283 persons 80 years and older showed a tendency for an increased total mortality and cardiovascular mortality in the treatment groups.[110]

Overall, available studies do not support treating cholesterol in persons in long-term care. Treatment of hypertension to a level of 160 mm Hg may be reasonable provided that orthostasis is regularly measured, postprandial hypotension is taken into account, and pseudohypertension is excluded.[111–114]

SOME POSITIVE EVIDENCE-BASED STUDIES

There is evidence that calcium and vitamin D (800 IU per day) decreases hip fracture in nursing homes.[115] There is also emerging evidence that low vitamin D levels are associated with sarcopenia, decreased muscular strength, disability, and falls and that treatment of persons with low vitamin D reverses these conditions.[113,116–119] Osteoporosis is poorly recognized and treated by physicians, making this a priority area to which nursing home physicians should pay attention.[120–122]

There is excellent evidence that in persons over 70 with atrial fibrillation, use of coumadin decreases stroke and total mortality.[123] This is true even in persons who are prone to falling.[124] This approach is cost effective.[125] Because of the increased risk of major bleeding, aspirin should not be used with coumadin.[126] There is emerging data to support the measurement of genotypes (CYP2c9 and VKOR c1) as well as using algorhythms to improve coumadin dosing (www.warfarindosing.org).

There are numerous positive effects of exercise including decreased dysphoria, enhanced VO^2 max, decreased sarcopenia and frailty, and increased bone mineral density.[127,128] Recently aerobic exercise for 6 months was found to decrease the rate of brain atrophy.[129] In the nursing home, Rolland et al[130] showed that exercise in demented residents decreased the decline in ADLs by 0.39.

DOES OBRA MAKE THEM DO IT?

Many nursing homes claim that they are forced to do certain things in order to comply with the federal OBRA '87 regulations, regardless of whether they are evidence-based. But a recent study challenges that notion.

In recent years, the Centers for Medicare and Medicaid Services (CMS) has substantially revised many of the guidelines that help surveyors interpret specific OBRA regulations (so-called "F-Tags"), to try to reflect relevant evidence and care process. F-Tag 315 covers urinary incontinence. A recent review of the content of the F315 guidance found that it is mostly consistent with published evidence, most of which has been present in the literature for 10 years or longer. Despite that, knowledge of the evidence about urinary incontinence among facility staff and practitioners is weak, and many practices do not reflect the evidence.[131]

The OBRA regulations do not demand irrelevant or hasty interventions at the expense of thoughtful consideration of the problem and targeted approaches. Evidence-based approaches consider the rationale for and context of interventions. Approaches that are incompatible with the evidence overemphasize what was done rather than why it was pertinent to the individual. In geriatrics, more is not necessarily better. A single intervention properly targeted to underlying causes may be more effective and less problematic than di-

verse interventions that are based on "cookbook" or guesswork approaches.

Thus, despite the limitations of regulations and challenges associated with surveying effectively, it is questionable just how much nursing home staff, practitioners, and surveyors recognize or apply valid evidence in either providing or overseeing the care. And, failure to recognize and respect evidence can result in violation of individual rights, creation of additional risks, and irrelevant or harmful interventions (such as avoidable feeding tube placement).

CHALLENGES IN TURNING EVIDENCE INTO ACTION

In any setting, there are many challenges to turning evidence into action. Diverse factors affect whether people will do the right thing in the right way.[132] Examples include whether people know what to do and how to do it, whether they believe that their way is better or that the way in which they are asked to do things won't work, whether they fear negative consequences for doing the right thing, or whether they are rewarded or have no consequences for doing the wrong thing.

In nursing homes, additional influences include the core knowledge, skills, and experience of staff and practitioners, as well as how well the facility and its leadership guides and supports their performance, the knowledge and beliefs of clinical leadership, the facility's politics, the extent of understanding of basic principles of care process and geriatrics, the caliber of physicians and medical direction, interactions between physicians and other staff, and how ownership and leadership balance concern for regulatory compliance with support for proper care processes and evidence-based practices as the primary route to such compliance.

In other words, many issues and agendas influence the care in nursing homes, and they often overwhelm the application of evidence. A culture is needed in which evidence-based processes and practices predominate.

CONCLUSIONS

Compared to the past, nursing home care has improved in many ways. But as in all settings, nursing home practices vary widely in the extent to which they reflect key evidence, much of which is enduring and universally relevant.

We suggest the need to rethink much of today's rhetoric about "evidence-based" care in nursing homes. Many current guidelines are "eminence"-based rather than truly evidence-based. There may be too much emphasis on identifying and treating individual conditions to attain regulatory compliance and meet quality initiative objectives. It would help to also focus on evidence about what should *not* be done, or what is unlikely to be helpful. Just stopping many of the common non–evidence-based practices in nursing homes could free up time and resources to offer more individualized care that can improve patient outcomes.

To improve the available evidence for treatment of long-term residents we suggest the following:

- The FDA requires at least 1 long-term care study for any new drug that may be expected to be used in persons older than 70.
- Have clinical guidelines explicitly state that there is no evidence in long-term care.
- Require a long-term care surveillance of at least 1000 person years within 2 years of drug release. The FDA should publish these results online.

We suggest that nursing homes could improve care greatly by identifying and applying basic geriatrics principles and approaches (for example, always consider the "big picture" and try to avoid doing harm while trying to do good). In addition, those who are trying to "fix" nursing homes should be sure that they are not exacerbating the problem by promoting fragmented or tangential solutions or those that are not aligned with evidence. For example, the "quality indicator" approach to trying to improve nursing home care quality may not sufficiently respect the evidence about viewing individual components of care in the context of the "big picture." And, questions remain about whether "pay-for-performance" strategies will simply reward those who are already doing the right thing while failing to inhibit or change the performance of those who ignore existing evidence.[133]

Table 1 offers examples of how we can improve our adherence to "true" evidence for our patients. There is considerable activity in the United States to try to improve nursing home care. Ultimately, much of the evidence related to improving quality already exists, but is not being applied. Much of this evidence substantially challenges current "conventional wisdom" and common practices. Perhaps it is time to rethink the wisdom of our approaches.[93]

Table 1. *How to Improve Adherence to Evidence in Long-Term Care*

- Ask if a guideline explicitly states that it was developed using evidence in older or long-term care patients
- Use the Cochrane database
- Improve consultant pharmacy activity and physician interaction
- Develop a single nationwide computerized medical record with reminders and warnings
- Demand that studies with new drugs are done in long-term care residents
- Read the *Journal of the American Medical Directors Association* (personal bias!)

REFERENCES

1. Committee on Nursing Home Regulation. Improving the quality of care in nursing homes. Washington, DC: National Academy Press, 1986.
2. Committee on Improving Quality in Long-term Care. Improving the quality of long-term care. Washington, DC: National Academy Press, 2001, p. 5–6.
3. Saliba D, Rubenstein LV, Simon B, et al. Adherence to pressure ulcer prevention guidelines: Implications for nursing home quality. J Am Geriatr Soc 2004;52(1):164.
4. Coleman EA, Marta JM, Lin MK, Kramer AM. Pressure ulcer prevalence in long-term nursing home residents since the implementation of OBRA '87. J Am Geriatr Soc 2002;50:728–732.

5. Johnson TM, Ouslander JG. The newly revised F-Tag 315 and surveyor guidance for urinary incontinence in long-term care. J Am Med Dir Assoc 2006;7:594–600.
6. Teno JM, Fisher ES, Hamel MB, Coppola K, Dawson NV. Medical care inconsistent with patients' treatment goals: Association with 1-year Medicare resource use and survival. J Am Geriatr Soc 2002;50:496–500.
7. Skilled Nursing Facilities in a Changing World. In the Senior Care Source: Facts Figures, and Forecasts. East Hanover, NJ: Novartis Pharmaceuticals, 2006; vol. 4, pp 27-45.
8. Katz PR, Karuza J, Lawhorne L, Schnelle JF. The nursing home physician workforce. J Am Med Dir Assoc 2002;7:394–398.
9. Levenson SA. The Maryland Regulations: Rethinking physician and medical director accountability in nursing homes. J Am Med Dir Assoc 2002;3:79–94.
10. Berlowitz DR, Frantz RA. Implementing best practices in pressure ulcer care: The role of continuous quality improvement. J Am Med Dir Assoc 2002;8:S37–S41.
11. Definitions of Best Practices on the Web. Available at: http://www.google.com/search?hl=en&defl=en&q=define:Best+practices&sa=X&oi=glossary_definition&ct=title. Accessed August 17, 2007.
12. Feldt KS. The complexity of managing pain for frail elders. J Am Geriatr Soc 2004;52:840.
13. Boyd CM, Darer J, Boult C, Fried LP, Boult L, Wu AW. Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases: implications for pay for performance. JAMA 2005;294:716–724.
14. O'Connor PJ. Adding value to evidence-based clinical guidelines. JAMA 2005;294:741–743.
15. Reuben DB. Guidelines, evidence-based medicine, and glidepaths: Talking the talk. J Am Geriatr Soc 2002;50:1905–1906.
16. Ferrell BA. Pain evaluation and management in the nursing home. Ann Intern Med 1995;123:681–687.
17. Jones RN, Marcantonio ER, Rabinowitz T. Prevalence and correlates of recognized depression in US nursing homes. J Am Geriatr Soc 2003;51:1404–1409.
18. Steinman MA, Landefeld CS, Rosenthal GE, Berthenthal D, Sen S, Kaboli PJ. Polypharmacy and prescribing quality in older people. J Am Geriatr Soc 2006;54(10):1516–1523.
19. Smith MA, Cox ED, Bartell JM. Overprescribing of lipid lowering agents. Quality and Safety in Health Care 2006;15:251–257.
20. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, Jones DW, Materson BJ, Oparil S, Wright JT, Roccella EJ, and The National High Blood Pressure Education Program Coordinating Committee. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure: The JNC 7 report. JAMA 2003;289:2560–2572.
21. Qiu C, Von Strauss E, Fastbom J, Winblad B, Fratiglioni L. Low blood pressure and risk of dementia in the Kungsholmen Project: A 6-year follow-up study. Arch Neurol 2003;60:223–228.
22. Ooi WL, Hussain M, Lipsitz LA. The association between orthostatic hypotension and recurrent falls in nursing home residents. Am J Med 2000;108:106–111.
23. Lebowitz BD, Pearson JL, Schneider LS, et al. Diagnosis and treatment of depression in late life. Consensus statement update. JAMA 1997;278:1186–1190.
24. American Society of Consultant Pharmacists. Available at: http://www.ascp.com/resources/clinical/upload/ASCPOscarData.pdf. Accessed May 23, 2007.
25. Lantz MS. Serotonin syndrome in the older adult. Clin Geriatr 2006;14:13–16.
26. Anía BJ, Suman VJ, Fairbanks VF, et al. Incidence of anemia in older people: An epidemiologic study in a well defined population. J Am Geriatr Soc 1997;45:825–831.
27. Anonymous. FDA Public Health Advisory: Erythropoiesis-stimulating agents (ESAs). March 13, 2007. Available at: http://www.fda.gov/cder/drug/advisory/RHE2007.htm. Accessed May 21, 2007.
28. Strippoli GF, Tognoni S, Navaneethan SD, Nicolucci A, Craig JC. Haemoglobin targets: We were wrong, time to move on. Lancet 2007;369:346–350.
29. Coyne DW, Singh AK. Epoetin therapy risks and benefits: Just the facts. Available at: http://www.medscape.com/viewarticle/554884. Accessed May 21, 2007.
30. Thomas DR. Anemia: it's all about quality of life. J Am Med Dir Assoc 2007;8:80–82.
31. Ferrell BA, Ferrell BR, Osterweil D. Pain in the nursing home. J Am Geriatr Soc 1990;38(4):409–414.
32. In the Face of Pain: Pain Management Advocacy Toolkit, p. 5–9. http://www.partnersagainstpain.com/advocacy/PDFs/In_the_Face_of_Pain.pdf. Accessed May 21, 2007.
33. Meier B. Narcotic maker guilty of deceit over marketing. *New York Times*. May 11, 2007. Available at: http://www.nytimes.com/2007/05/11/business/11drug.html?pagewanted=1&ei=5088&en=1408963d3a4a8436&ex=1336536000&partner=rssnyt&emc=rss. Accessed May 21, 2007.
34. Position of the American Dietetic Association: Liberalization of the diet prescription improves quality of life for older adults in long-term care. J Am Dietetic Assoc 2005;105:1955–1965.
35. Shah K, Rogers J, Britigan D. Should we identify and treat hyperlipidemia in the advanced elderly? J Fam Pract 2006;55(4):356–357. Available at: http://www.jfponline.com/Pages.asp?AID=4018&UID=, Accessed May 21, 2007.
36. Negative Feedback Control. Available at: http://www.biology-online.org/4/1_physiological_homeostasis.htm. Accessed June 25, 2007.
37. Inouye SK, Studenski S, Tinetti ME, Kuchel GA. Geriatric syndromes: Clinical, research, and policy implications of a core geriatric concept. J Am Geriatr Soc 2007;55:780–791.
38. Hoenig H, Nusbaum N, Brummel-Smith K. Geriatric rehabilitation: State of the art. J Am Geriatr Soc 1997;45:1371–1381.
39. Parmelee PA. Quality improvement in nursing homes: The elephants in the room. J Am Geriatr Soc 2004;52:2138–2140.
40. Tariq SH. Constipation in long-term care. J Am Med Dir Assoc 2007;8:209–218.
41. Hosia-Randell H, Suominen M, Muurinen S, Pitkala KH. Use of laxatives among older nursing home residents in Helsinki, Finland. Drugs Aging 2007;24:147–154.
42. Harari D, Gurwitz JH, Avorn J, et al. Correlates of regular laxative use by frail elderly persons. Am J Med 1995;99:513–518.
43. Harari D, Gurwitz, Avorn J, et al. Constipation: Assessment and management in an institutionalized elderly population. J Am Geriatr Soc 1994;42:947–952.
44. Hurdon V, Viola R, Schroder C. How useful is docusate in patients at risk for constipation? A systematic review of the evidence in the chronically ill. J Pain Symptom Manage 2000;19:130–136.
45. Petticrew M, Watt I, Sheldon T. Systematic review of the effectiveness of laxatives in the elderly. Health Technol Assess 1997;1:i–iv, 1–52.
46. Volicer L, Lane P, Panke J, Lyman P. Management of constipation in residents with dementia: Sorbitol effectiveness and cost. J Am Med Dir Assoc 2005;6(3 Suppl):S32–S34.
47. Ambizas EM, Ginzburg R. Lubiprostone: A chloride channel activator for treatment of chronic constipation. Ann Pharmacother 2007;41:957–964.
48. Johanson JF, Ueno R. Lubiprostone, a locally acting chloride channel activator, in adult patients with chronic constipation: a double-blind, placebo-controlled, dose-ranging study to evaluate efficacy and safety. Aliment Pharmacol Ther 2007;25:1351–1361.
49. Neufeld RR, Libow LS, Foley WJ, et al. Restraint reduction reduces serious injuries among nursing home residents. J Am Geriatr Soc 1999;47:1202–1207.
50. Capezuti E, Evans L, Strumpf N, Maislin G. Physical restraint use and falls in nursing home residents. J Am Geriatr Soc 1996;44:627–633.
51. Dimant J. Avoiding physical restraints in long-term care facilities. J Am Med Dir Assoc 2003;4:207–215.
52. Capezuti E, Strumpf NE, Evans LK, et al. The relationship between physical restraint removal and falls and injuries among nursing home residents. J Gerontol A Biol Sci Med Sci 1998;53:M47–M52.

53. Johnson RH. Urinary catheters: A one-point restraint? Ann Intern Med 2003;138:W–W51.
54. Ouslander JG, Greengold B, Chen S. Complications of chronic indwelling urinary catheters among male nursing home patients: A prospective study. J Urol 1987;138:1191–1195.
55. Kim MJ, Rolland Y, Cepeda O, Gammack JK, Morley JE. Diabetes mellitus in older men. Aging Male 2006;9:139–147.
56. Morley JE. Anorexia and weight loss in older persons. J Gerontol A Biol Sci Med Sci 2003;58:131–137.
57. Morley JE, Silver AJ. Nutritional issues in nursing home care. Ann Intern Med 1995;123:850–859.
58. Morley JE. The elderly type 2 diabetic patient: Special considerations. Diabet Med 1998;15(Suppl 4):S41–S46.
59. Tariq SH, Karcic E, Thomas DR, et al. The use of a no-concentrated-sweets diet in the management of type 2 diabetes in nursing homes. J Am Diet Assoc 2001;101:1463–1466.
60. Coulston AM, Mandelbaum D, Reaven GM. Dietary management of nursing home residents with non-insulin-dependent diabetes mellitus. Am J Clin Nutr 1990;51:67–71.
61. Mazza AD, Morley JE. Metabolic syndrome and the older male population. Aging Male 2007;10:3–8.
62. Niedert KC, American Dietetic Association. Position of the American Dietetic Association: Liberalization of the diet prescription improves quality of life for older adults in long-term care. J Am Diet Assoc 2005;105:1955–1965.
63. American Diabetes Association. Nutrition recommendations and interventions for diabetes. Diabetes Care 2007;30:548–565.
64. Rimon E, Kagansky N, Kagansky M, et al. Are we giving too much iron? Low-dose iron therapy is effective in octogenarians. Am J Med 2005; 118:1142–1147.
65. Ouslander JG, Schapira M, Schnelle JF, et al. Does eradicating bacteriuria affect the severity of chronic urinary incontinence in nursing home residents? Ann Intern Med 1995;122(10):749–754.
66. Leonard R, Tinetti ME, Allure HG, Drickamer MA. Potentially modifiable resident characteristics that are associated with physical or verbal aggression among nursing home residents with dementia. Arch Intern Med 2006;166:1295–1300.
67. Ouslander JG, Schapira M, Schnelle JF, Fingold S. Pyuria among chronically incontinent but otherwise asymptomatic nursing home residents. J Am Geriatr Soc 1996;44:420–423.
68. Nicolle LE, SHEA Long-Term Care Committee. Urinary tract infections in long-term care facilities. Infect Control Hospital Epidemiol 2001;22:167–175.
69. Joshi S, Morley JE. Cognitive impairment. Med Clin North Am 2006; 90:769–787.
70. Lee J, Monette J, Sourial N, et al. The use of cholinesterase inhibitor review committee in long-term care. J Am Med Dir Assoc. 2007;8:243–247.
71. Zarowitz BJ, Stefanacci R, Hollenack K, et al. The application of evidence-based principles of care in older persons (issue 5): Alzheimer's disease. J Am Med Dir Assoc 2007;8:183–193.
72. Desai AK, Grossberg GT. Diagnosis and treatment of Alzheimer's disease. Neurology 2005;64(12 Suppl 3):S34–S39.
73. Lanctot KL, Herrmann N, Yau KK, et al. Efficacy and safety of cholinesterase inhibitors in Alzheimer's disease: A meta-analysis. CMAJ 2003;169:557–564.
74. McShane R, Areosa Sastre A, Minakaran N. Memantine for dementia. Cochrane Database Syst Rev 2006;19:CD003154.
75. Belgeri M, Morley JE. A step back in time: Is there a place for older drugs in the treatment of dementia? J Gerontol A Biol Sci Med Sci 2004;59:1025–1028.
76. Flaherty JH, Morley JE. Delirium: A call to improve current standards of care. J Gerontol A Biol Sci Med Sci 2004;59:341–343.
77. Flaherty JH, Rudolph J, Shay K, et al. Delirium is a serious and under-recognized problem: Why assessment of mental status should be the sixth vital sign. J Am Med Dir Assoc 2007;8:273–275.
78. Schneider LS, Tariot PN, Dagerman KS, et al. Effectiveness of atypical antipsychotic drugs in patients with Alzheimer's disease. N Engl J Med 2006;355:1525–1538.
79. Franco KN, Messinger-Rapport B. Pharmacological treatment of neuropsychiatric symptoms of dementia: A review of the evidence. J Am Med Dir Assoc 2006;7:201–202.
80. McGee S, Abernathy WB, Simel DL. Is this patient hypovolemic? JAMA 1999;281:1022–129.
81. Thomas DR, Tariq SH, Makhdomm S, Haddad R, Moinuddin A. Physician misdiagnosis of dehydration in older adults. J Am Med Dir Assoc 2003;4:251–254.
82. Morley JE. Weight loss in the nursing home. J Am Med Dir Assoc 2007;8:201–204.
83. Rolland Y, Kim MJ, Gammack JK, et al. Office management of weight loss in older persons. Am J Med 2006;119:1019–1026.
84. Wilson MM, Vaswani S, Liu D, Morley JE, Miller DK. Prevalence and causes of undernutrition in medical outpatients. Am J Med 1998;104: 56–63.
85. Morley JE, Kraenzle D. Causes of weight loss in a community nursing home. J Am Geriatr Soc 1994;42:583–585.
86. Wilson MM, Purushothaman R, Morley JE. Effect of liquid dietary supplements on energy intake in the elderly. Am J Clin Nutr 2002;75: 944–947.
87. Sullivan DH, Roberson PK, Smith ES, Price JA, Bopp MM. Effects of muscle strength training and megestrol acetate on strength, muscle mass, and function in frail older people. J Am Geriatr Soc 2007;55: 20–28.
88. Evans WJ. Megestrol acetate use for weight gain should be carefully considered [editorial]. J Clin Endocrinol Metab 2007;92:420–421.
89. Wilson MM, Philpot C, Morley JE. Anorexia of aging in long term care: Is dronabinol an effective appetite stimulant? A pilot study. J Nutr Health Aging 2007;11:195–198.
90. Morley JE. Orezigenic and anabolic agents. Clin Geriatr Med 2002;18: 853–866.
91. Monturo CA, Strumpf NE. Advance directives at end-of-life: Nursing home resident preferences for artificial nutrition. J Am Med Dir Assoc 2007;8:224–228.
92. Finucane TE, Christmas C, Leff BA. Tube feeding in dementia: How incentives undermine health care quality and patient safety. J Am Med Dir Assoc 2007;8:205–208.
93. Smith PA. Nutrition, hydration, and dysphagia in long-term care: Differing opinions on the effects of aspiration. J Am Med Dir Assoc 2006; 7:545–549.
94. Lim SH, Lieu PK, Phua SY, et al. Accuracy of bedside clinical methods compared with fiberoptic endoscopic examination of swallowing (FEES) in determining the risk of aspiration in acute stroke patients. Dysphagia 2001;16:1–6.
95. Arai T, Sekizawa K, Yoshimi N, et al. Cabergoline and silent aspiration in elderly patients with stroke. J Am Geriatr Soc 2003; 51:1815–1816.
96. Arai T, Yasuda Y, Takaya T, et al. ACE inhibitors and symptomless dysphagia. Lancet 1998;352:115–116.
97. Kaiser FE, Morley JE. Cholesterol can be lowered in older persons. Should we care? J Am Geriatr Soc 1990;38:84–85.
98. Onder G, Landi F, Volpato S, et al. Serum cholesterol levels and in-hospital mortality in the elderly. Am J Med 2003;115:265–271.
99. Foody JM, Wang Y, Kiefe CI, et al. Long-term prognostic importance of total cholesterol in elderly survivors of an acute myocardial infarction: The Cooperative Cardiovascular Pilot Project. J Am Geriatr Soc 2003; 51:930–936.
100. Horwich TB, Hamilton MA, Maclellan WR, Fonarow GC. Low serum total cholesterol is associated with marked increase in mortality in advanced heart failure. J Cardiac Failure 2002;8:216–224.
101. Schutz IJ, Masaki K, Yano K, et al. Cholesterol and all-cause mortality in elderly people from the Honolulu Heart Program: A cohort study. Lancet 2001;358:351–355.
102. Morley JE, Baumgartner RN. Cytokine-related aging process. J Gerontol A Biol Sci Med Sci 2004;59:M924–M929.
103. Omran ML, Morley JE. Assessment of protein energy malnutrition in older persons, Part II: Laboratory evaluation. Nutrition 2000;16:131–140.

104. Shepherd J, Blauw GJ, Murphy MB, et al. Pravastatin in elderly individuals at risk of vascular disease (PROSPER): A randomized controlled trial. Lancet 2002;360:1623–1630.
105. Flaherty JH, Perry HM 3rd, Lynchard GS, Morley JE. Polypharmacy and hospitalization among older home care patients. J Gerontol A Biol Sci Med Sci 2000;55:M554–M559.
106. Swagerty D, Brickley R. American Medical Directors Association, American Society of Consultant Pharmacists joint position on the Beers List of Potentially Inappropriate Medications in Older Adults. J Am Med Dir Assoc 2005;6:80–86.
107. Schech S, Graham D, Staffa J, et al. Risk factors for statin-associated rhabdomyolysis. Pharmacoepidemiol Drug Saf 2007;16:352–358.
108. Staessen JA, Gasowski J, Wong JG. Risks of untreated and treated isolated systolic hypertension in the elderly: Meta-analysis of outcome trials. Lancet 2000;355:865–872.
109. Gueffyher F, Bulpitt C, Boissel J-P, The INDIANA Group. Antihypertensive drugs in very old people: A subgroup meta-analysis of randomized controlled trials. Lancet 1999;353:793–796.
110. Bulpitt CJ, Beckett NS, Cooke J. Results of the pilot study of hypertension in the very elderly trial. J Hypertension. 2003;21: 2409–2417.
111. Morley JE. Postprandial hypotension—the ultimate Big Mac attack [editorial]. J Gerontol A Biol Sci Med Sci 2001;56A:M741–M743.
112. Iwanczyk L, Weintraub NT, Rubenstein LZ. Orthostatic hypotension in the nursing home setting. J Am Med Dir Assoc 2006;7:163–167.
113. Aronow WS. Drug therapy of older persons with hypertension. J Am Med Dir Assoc 2006;7:193–196.
114. Kuwajima I, Hoh E, Suzuki Y, et al. Pseudohypertension in the elderly. J Hypertens 1990;8:429–432.
115. Chapuy MC, Arlot ME, Delmas PD, Meunier PJ. Effect of calcium and cholecalciferol treatment for three years on hip fractures in elderly women. BMJ 1994;308:1081–1082.
116. Morley JE. Should all long-term care residents receive vitamin D? J Am Med Dir Assoc 2007;8:69–70.
117. Hamid Z, Riggs A, Spencer T, et al. Vitamin D deficiency in residents of academic long-term care facilities despite having been prescribed vitamin D. J Am Med Dir Assoc 2007;8:71–75.
118. Munir J, Wright RJ, Carr DB. A quality improvement study on calcium and vitamin D supplementation in long-term care. J Am Med Dir Assoc 2007;8(3 Suppl 2):e19–e23.
119. Drinka PJ. The importance of parathyroid hormone and vitamin D status in the treatment of osteoporosis and renal insufficiency. J Am Med Dir Assoc 2006;7(3 Suppl):S5–S9.
120. Kamel HK, Hussain MS, Tariq S, et al. Failure to diagnose and treat osteoporosis in elderly patients hospitalized with hip fracture. Am J Med 2000;109:326–328.
121. Colon-Emeric CS, Casebeer L, Saag K, et al. Barriers to providing osteoporosis care in skilled nursing facilities: perceptions of medical directors and directors of nursing. J Am Med Dir Assoc 2005;6(3 Suppl):S61–S66.
122. Duque G, Mallet L, Roberts A, et al. To treat or not to treat, that is the question: Proceedings of the Quebec Symposium for the Treatment of Osteoporosis in Long-Term Care Institutions, Saint-Hyacinthe, Quebec, November 5, 2004. J Am Med Dir Assoc 2006;7: 435–441.
123. Fang MC, Chen J, Rich MW. Atrial fibrillation in the elderly. Am J Med 2007;120:481–487.
124. Gage BF, Birman-Deych E, Kerzner R, et al. Incidence of intracranial hemorrhage in patients with atrial fibrillation who are prone to fall. Am J Med 2005;118:612–617.
125. Sullivan PW, Arant TW, Ellis SL, Ulrich H. The cost effectiveness of anticoagulation management services for patients with atrial fibrillation and at high risk of stroke in the US. Pharmacoeconomics 2006;24: 1021–1033.
126. Flaker GC, Gruber M, Connolly SJ, et al. Risks and benefits of combining aspirin and anticoagulant therapy in patients with atrial fibrillation: An exploratory analysis of stroke prevention using an oral thrombin inhibitor in atrial fibrillation (SPORTIF) trials. Am Heart J 2006;152:967–973.
127. Singh MA. Exercise comes of age: Rationale and recommendations for a geriatric exercise prescription. J Gerontol A Biol Sci Med Sci 2002; 57:M262–M282.
128. Hui EK, Rubenstein LZ. Promoting physical activity and exercise in older adults. J Am Med Dir Assoc 2006;7:310–314.
129. Colcombe SJ, Erickson KI, Scalf PE, et al. Aerobic exercise training increases brain volume in aging humans. J Gerontol A Biol Sci Med Sci 2006;61:1166–1170.
130. Rolland Y, Pillard F, Klapouszczak A, et al. Exercise program for nursing home residents with Alzheimer's disease: A 1-year randomized, controlled trial. J Am Geriatr Soc 2007;55:158–165.
131. Johnson TM, Ouslander JG. The newly revised F-Tag 315 and surveyor guidance for urinary incontinence in long-term care. J Am Med Dir Assoc 2006;7:594–600.
132. Fournies FF. Why Employees Don't Do What They're Supposed To Do, and What To Do About It. New York: McGraw-Hill, 1999.
133. Levenson SA. "Pay for performance": Can it help improve long-term care? J Am Med Dir Assoc 2006;7:262–264.