

The National Nursing Home Resident Assessment Instrument

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A number of years ago, I met the father of a colleague, a delightful person who ran his own machining company in Connecticut. In the ebb and flow of conversation, I found that he was deeply enamored with the technical problem of machining a perfectly round ball bearing. Hardly a lifelong goal, you may think. But, as an amateur woodworker, I had some sympathy for his quest.

Your initial reaction to this talk, on how to assess the elderly, might be somewhat the same if I were to talk here about how to make a ball bearing. Simply put, “So what?” There is nothing new about performing assessments of elderly persons; this has been done as part of routine medical care—the physical examination and history—for centuries. Then why is there new interest in a relatively mundane topic?

I believe the answer lies in major improvements in two areas: first, new approaches to the technology of the assessment process, and second, innovative uses for the data obtained. I hope to show that these innovations have led to a system that not only has made theoretic advances, but also has demonstrated improvements in our long-term care system. Moreover, this approach provides a strong basis for the research from which further improvements can flow.

My comments will involve the work I and colleagues have done on developing, implementing, and exploring applications of the National Nursing Home Resident Assessment Instrument, the “RAI.” In response to problems of quality of care in U.S. nursing homes, the federal government initiated a remarkable number of reforms in the Omnibus Budget Reconciliation Act of 1987 (OBRA '87). A key reform was a commitment to a uniform assessment of all nursing home residents as the linchpin for other reforms. Our team—five researchers from two universities, a research institution, and a large nursing home—was contracted in 1989 to develop the RAI and evaluate its implementation; all the work I describe here was performed by me and the rest of my group. A bibliography is appended for those who might want more details about the RAI or our research than is provided here.

The New Technology of Assessment

The criteria for good assessment instruments are well known; there’s nothing much new here. Most critically, they have to provide accurate and reproducible data on a broad range of important domains. By *accurate*, we mean that an assessment item should provide a response that is descriptive of the referenced characteristic and should be sensitive enough to distinguish at least major changes in status. By *reproducible*, we mean that if the assessment item were performed twice, say by two different assessors within a short period of time, they would arrive at the same response. Finally, by *breadth* we mean that the items of the assessment cover all the salient components necessary for the particular application. Note, however, that a result of this last criterion is that the assessment design is relative to its purpose, and an assessment for one purpose may not well serve others; I will return to this issue later. How the assessment is performed—by self-reporting or by an observer, electronically or by pen and paper, and so forth—will have less impact on these criteria than the design of the assessment itself.

What can be done to improve an assessment process? I have several suggestions from our RAI development effort:

- *Include full definitions.* For example, rather than just have an item refer to “eating,” it’s better to indicate what is meant, right on the form. What if a person is fed by others? Gets nutrition through an IV? Or is able to eat but is unable to avoid making a total mess of his or her clothes and the table? In the RAI, we have used the definition “How resident eats and drinks (regardless of skill).”
- *Include examples and exclusions that deal with common confusions about responses.* To return to the eating example, should a person be considered dependent in eating if they require someone to open a milk carton or carry their tray to a table? We have taken the position that such activities are not really part of eating and are primarily dependent upon the setting; as such, they should be excluded. Such information

needs, however, to be part of the assessment system and clearly indicated on the form (instrument) or in training materials.

- *Include time delimiters.* Is the person unable to dress today (due to a flare-up of his arthritis), this week, this month? The choice of a time frame has implications and the lack of such specification makes the information unreliable and potentially unusable.
- *Use all possible sources of information.* There are distinct advantages to self-reported assessments, not only as they can usually be accomplished with less cost, but, more importantly, they capture subjective feelings and opinions of the subject. However, some information is not as well provided by the elder, such as diagnoses or the use of health services. The elder cannot be trained in accurate assessment or may bias a response because of embarrassment, avoidance, or lack of knowledge or perspective. The best scenario, used in the RAI, is to combine the two methods, collecting information both directly from the elder and from all others knowledgeable about the elder, including family, professionals (e.g., physicians, nurses, social workers[!], therapists, nurse aides) and non-professionals, such as a spouse, adult child, or neighbor who helps the elder.
- *Cover all domains.* It is common knowledge that any assessment of elders must go beyond medical conditions and diagnoses to physical and mental function, and then to psychosocial well-being and measures of involvement. We need to understand not only individuals' weaknesses, but also their strengths. The "down side" is that an assessment instrument can get excessively long and we have to find a balance between length and comprehensiveness. Not every item, scale, or even domain can be included, for this would be unwieldy. While not small, the RAI's assessment instrument, the "Minimum Data Set" (MDS), with close to 400 items, was the smallest instrument we felt could accomplish its goal.

Ultimately, however, the value of an assessment instrument derives from its intended use. In the case of nursing homes, the primary applications are in patient care, regulatory functions, management, and research. Patient care includes the determination of care plans and identification of the appropriate level of care. For years, I have been interested in case mix (measuring the intensity of care provided to different types of nursing home residents) and quality measures—regulatory functions, and also the starting point for facility management. Research can include everything from epidemiology to health policy analysis.

Let me start by discussing the application to patient care. The OBRA '87 mandate was to create an RAI that met one and only one goal: improvement of care planning. The logic was that improved assessment would lead to improved care plans and, in turn, to improved quality of care. This had two ramifications for us. First, we included in the RAI's assessment instrument (the MDS) only items that support this application, no matter how urgent or attractive other items were. In this, we enlisted the assistance of hundreds of professionals and professional organizations to understand the breadth of items needed, but also to balance the content. We have quipped that we knew we were done when everyone was equally unhappy that more of their own material was not included. Second, we had to assist staff to go the next step beyond the assessment, to use the information therein to mold a care plan that would address better an individual resident's needs. We cannot do this only with the assessment. We also designed a set of care planning guidelines—Resident Assessment Protocols (RAPs). There are eighteen RAPs, each addressing a major problem of nursing home residents, such as falls, incontinence, and mood problems. Linking the MDS assessment and the RAPs is a set of "triggers," or logic that tells you whether a resident has or is at risk of having each problem. For each RAP, guidelines help caregivers consider the issues in designing a good plan that addresses the resident's problems. The guidelines speak to whether you have considered that one problem may masquerade as another: have you considered that loss of communication attributed to dementia might actually be caused in this patient by a loss of hearing? Could this be a side effect of a particular medication and have you considered a "drug holiday" or a change in therapeutic dose? While not telling you what to do, the guidelines challenge and help you think through the process of care for the individual elder. Overall, the RAPs are critical in that they help assessors understand what they are to do with the assessment data. The RAI system—MDS plus RAPs—then becomes more than just a "paper instrument" collected for some regulatory or management purpose. Rather than a burden that takes staff away from patient care, the assessment provides the essential information that we must know to provide care.

In our evaluation of the national implementation of the RAI, we found strong evidence that all of these theoretical steps had occurred. Comparing a nationally representative sample of nursing home residents in 1991, before the RAI implementation, with those post-RAI in 1993, we found that assessments were more accurate and complete, care plans were more likely to address residents' problems, and conditions specifically addressed in the RAI decreased in prevalence and incidence. The result was that outcomes were improved, such as slowed rates of decline in function and a 27% reduction in hospitalization from the nursing home. Hospitalizations declined both because nursing homes identified problems and were better able to deal with them without transfers and because the problems were prevented in the first place. In questioning nursing home directors and directors of nursing, about two-thirds of the facilities were positive about the RAI and felt it improved their process of assessment. We are proud that the implementation of the RAI has caused substantive changes in nursing homes and has been the foundation for other important nursing home changes in this decade. The linking of care planning directly to assessment is fundamental to the "New Technology" to which I referred earlier.

But what about the other areas of application? Here, too, we see aspects of the "New Technology." In creating the RAI, there was a distinct advantage in designing the assessment around its clinical use. This provides the foundation for the assessment and its accuracy: what responsible clinician wouldn't do the best job possible in the care they provide? However, once these data are available, motivated, and collected for this primary purpose, all the other uses described earlier are valuable, yet virtually free, by-products. Further, multiple uses of the data can encourage their accuracy. For instance, consider an assessment item such as pressure ulcers. It is an indicator of a resident whose care is expensive, both for the care of the ulcer and for the other conditions such a sick patient would have. Therefore, a facility paid under a case-mix payment system would get more money if the pressure ulcer was reported. But pressure ulcers are often also used as a measure of poor quality of care, thereby encouraging underreporting. Use of the RAI item on pressure sores simultaneously for both case mix and for quality provides counterbalancing forces to encourage accurate assessment of this item.

Overall, the RAI not only meets its primary goal, but also provides accurate assessment data for multiple other applications. In the second part of this talk, I will address some examples.

Six Million Assessments

The RAI has provided us with a rich source of accurate data to examine the nursing home population. Since 1992, thirteen states have computerized their RAI data, usually to enable payment of nursing homes based on case-mix (under new regulations, all states will begin this process within a year). Assessments are performed on admission to nursing homes, on significant change, and at least annually, so that there are multiple assessments of the same individual over time. I have been gathering these data in the University of Michigan Assessment Archive Project (UMAAP). UMAAP currently has over six million U.S. RAI assessments. I believe that the combination of number of assessment and detailed information in each assessment makes it the largest health-related data set ever assembled. In the rest of this talk I want to address the opportunities opened up by such a data archive.

The most obvious advantage of UMAAP is the sheer number of observations, permitting examining of even very rare populations with sample sizes large enough to perform sensitive analysis. Let me give an example.

In the past few months we have been examining centenarians. Using data from only seven of our thirteen states, we had 193 thousand residents over 80, including 113 thousand octogenarians, 74 thousand nonagenarians, and 6 thousand centenarians. We had enough observations so that every age from 80 to 104 was represented by at least 400 individuals, and 289 individuals of age 105. With these, we plotted the prevalence of a large number of residents' characteristics by year of age (80 to 105). The characteristics chosen included measures of function, cognition, behavior problems, diseases, and conditions. Figure 1 shows a plot of prevalence typical for a measure of functional impairment: here a measure of severely impaired cognition, by individual age. As could be expected, the prevalence of severe impairment increased with age. By observation, this increase was relatively constant from a prevalence of 23% at age 80 up to the mid-twenty percent in the late 90s. However, there we saw a shift in the annual change in prevalence. We fit a 2-slope model to these data points and found the model best fit when

the slope changed at age 97 (see model superimposed on the data points). This model showed an increase of 0.2% per year for ages 80 to 97, but after a “kink” at 97 the increase was much greater: 1.1% per year.

Many, but not all, of the measures examined demonstrated these characteristics. This “kink” was found in measures of functionality, including all of the Activities of Daily Living (self-performance of eating, toileting, bed-to-chair transfer, dressing, etc.), continence, cognitive function, and one diagnosis—arthritis. Many other measures showed no or only minor slope change, including all the other diagnoses (diabetes, hypertension, cardio-vascular accident, etc.), depression, anxiety, behavior problems, falls, and weight loss. Most of the “kinks” were in the middle or late nineties.

We really do not know what causes this accelerated decline in function in the late 90s and 100s, independent of disease. One possibility is that the human body just “wears out.”

My point for displaying these results here is that this type of analysis has never before been possible with accurate data, as samples of centenarians have been limited to numbers usually a tenth as great. With six thousand centenarians, we can go much further than we have already, to examine subpopulations: the differences between male and female centenarians, those with or without dementia, and so forth.

In addition to the large number of residents, we have in UMAAP’s millions of observations full representation of the patient census of all—and thus large numbers of—facilities. We are pursuing research into the epidemiology of facilities: how have facilities changed to respond to new incentives in the long-term care industry? Do non-profit facilities have better measures of quality of care? Do facilities with fewer demented residents achieve better outcomes for those residents not demented?

UMAAP’s 6 million assessments represent about 3 million unique individuals—i.e., about two assessments per individual. Thus we can assemble longitudinal views of nursing home residents. We are just beginning to tap this resource, but will be able to examine up to four years of assessments of an elderly person. What presages a terminal decline, and is it different for the oldest-old? In those with loss of body mass, do those with an aggressive feeding program fare better?

Finally, UMAAP maintains over 10,000 assessments from other nations. They are the result of implementations on the national (Iceland), provincial/regional (two Italian districts and [forthcoming] four Canadian provinces) or city (all of Copenhagen, a quarter of Stockholm) level, or from major studies in several other nations. With these data, we are able to compare sensitively nursing home populations in nations with differing long-term care systems, financing systems, practice patterns, and cultural norms.

While substantial differences are seen, there are many commonalities across the nations. Of most interest has been that across multiple measures of quality of care, no nation is uniformly superior. Rather, each nation can teach about the care of some type of nursing home resident and learn from other countries about the care of other residents.

All of these applications are not just of theoretic interest. They represent potential areas that can be identified for future intervention. While the RAI, by pushing the frontier of assessment technology, has already demonstrated success, we expect much more in the future, as the RAI becomes the cornerstone for more sensitive measures of quality, better facility management, and wise federal policy. In developing the RAI, we believe we have significantly advanced the technology of assessment and knowledge about the elderly. In analogy to my colleague’s father, perhaps the wheels will now turn just a bit better.

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Brant E. Fries is on the faculty of the U-M School of Public Health as Professor of Health Management and Policy, and head of the concentration in Long-Term Care Administration and Policy. He is a senior research scientist at the Institute of Gerontology. Professor Fries is the chief of Health Systems Research for the Geriatric Research, Education, and Clinical Center at the Ann Arbor Veterans Administration Medical Center. He is a core director for Methodology, Data Management, and Analysis in the Michigan Older American Independence Center.

Dr. Fries is a co-author of the National Nursing Home Resident Assessment Instrument, the nationwide assessment system mandated by Congress, and of the Resource Utilization Groups (RUG-III) Case-Mix Measurement System recently adopted to pay for nursing home care nationwide under Medicare. He is president of InteRAI, a sixteen-nation consortium of researchers with interests in cross-national comparisons of nursing homes using assessment data, and developing assessment instruments for community-based elders, acute care, and inpatient psychiatric care.

Dr. Fries is the author of three books and over seventy articles on long-term care and quantitative modeling of health care systems. His current work is in designing nursing facility payment systems, understanding longitudinal patterns of health care use by the elderly, and the development, computerization, and use of assessment data for measuring and improving long-term care in institutional and community settings.