Improving nursing home quality of care through outcomes data: the MDS quality indicators

David R. Zimmerman*

Center for Health Systems Research and Analysis, University of Wisconsin-Madison, Madison, WI, USA

SUMMARY

Background The quality of care provided to nursing home residents is a continuing source of concern throughout the world. In the United States, the Health Care Financing Administration mandated the use of a standardised resident assessment instrument, called the Minimum Data Set (MDS) which facilitated the development of a set of nursing home quality of care indicators.

Methods The MDS Quality Indicators were developed by a team of researchers at the University of Wisconsin-Madison and covered 12 domains, as well as associated risk factors. This initial set of indicators then went through an iterative process of review by national clinical panels, further empirical analysis, validation studies, and pilot tests, to confirm whether they were accurate, reliable and useful tools for identifying quality problems.

Results The final set of MDS Quality Indicators includes 24 variables that include both processes and outcomes of care and prevalence and incidence measures. They are defined at both the resident and facility level. Four of the indicators are risk-adjusted.

Conclusion The indicators have several possible applications: a source of consumer information; to help guide policy makers; and to assist providers in conducting quality improvement initiatives and to evaluate the impact of these efforts.

Copyright © 2003 John Wiley & Sons, Ltd.

key words — quality improvement; performance measures; minimum data set; assessment; nursing homes

INTRODUCTION

The quality of care provided to nursing home residents is a continuing source of concern throughout the world. In the United States, a study commissioned by the Institute of Medicine more than 15 years ago found that there were serious deficiencies in nursing home care across the country (IOM, 1986). One key result of that study was the enactment and implementation of the Nursing Home Reform Act of 1987. This required that the Health Care Financing Administration develop and mandate the use of a standardised resident assessment instrument, called the Minimum Data Set (MDS). The latter was developed and implemented several years later, and all nursing homes in the United States were required to use the MDS in the resident assessment process. The universal use of this instrument provided the opportunity to develop a set of measures of quality of care that could be used in nursing home quality assurance and internal provider quality improvement efforts. This article describes the background for those indicators, chronicles their development as part of a national demonstration, outlines the indicators and their specific definitions, and documents the use of the indicators in the United States in a variety of ways by multiple audiences.

CONCEPTUAL FRAMEWORK

It is well accepted that quality of nursing home care is multi-dimensional. There have been several attempts to construct taxonomies of nursing home care, but most of them have followed some variation...
of a common categorisation scheme that includes the following elements of care:

- Medical/clinical care
- Functional care, including three subcategories of physical, cognitive, and emotional functioning
- Psychosocial aspects of resident status
- Preservation of resident rights, such as dignity, privacy, autonomy, etc.

The subjective nature of nursing home care has led to its description as a ‘value-laden’ concept (Davis, 1991). This subjectivity, in combination with its complex multi-dimensionality, has led to difficulties in the development of quality of care concepts, as well as attempts to operationalise these concepts in the form of measures.

The paradigm that continues to enjoy greatest acceptance in the measurement of nursing home quality is the Structure, Process, Outcome framework developed by Donabedian (1980) and underlies the development of the MDS Quality Indicators.

DEVELOPMENT OF THE MDS QUALITY INDICATORS

The MDS Quality Indicators were developed by a team of researchers at the Center for Health Systems Research and Analysis (CHSRA) at the University of Wisconsin-Madison. They were developed as part of a national demonstration to develop and test both a payment system and quality monitoring system based on the resident level data in the MDS. This involved extensive interdisciplinary clinical input, empirical analyses, and field-testing. Clinical and research staff at the University of Wisconsin-Madison developed an initial draft of a set of indicators and potential associated risk factors. These were based on an extensive review of relevant clinical research literature and the care-planning guidelines. Out of this review came a proposed set of indicators covering 12 domains, or areas of care, which are presented in Table 1.

This initial set of indicators was reviewed by national clinical panels representing the major disciplines involved in the provision of nursing home care, including nursing, medicine, pharmacy, medical records, social work, dietetics, physical therapy, occupational therapy, and speech and language therapy, as well as resident advocates and administrators. The panels provided a rigorous critique, assisted in refining or deleting proposed quality indicators, and suggested new quality indicators. As a result of the initial development and clinical review, 175 quality indicators representing the 12 domains of care were developed. These were subjected to further study to determine their clinical validity, feasibility or usefulness of the information, and statistical robustness. As a result of these analyses, the number of quality indicators was reduced to approximately 100, and then further to 31 indicators. These were then subjected to series of pilot tests to determine their utility and feasibility in guiding the nursing home quality assurance process (called the ‘survey process’ in the US) and additional revisions were made (Karon and Zimmerman, 1996). The revised set of indicators was then the subject of validation testing, which is described in a subsequent section.

The final revision of the quality indicators was necessitated by the need to make the indicators compatible with data from the MDS Version 2.0 (Morris et al., 1995). In the United States, a complete MDS assessment is required of residents only upon admission, significant change in status, and annually. Assessments are completed every three months, but the facilities need only collect a subset of data. As a result, it was necessary to modify the quality indicators to accommodate the more limited scope of quarterly data, which resulted in a further reduction in the number of quality indicators, which are presented later.

Quality indicator characteristics

Quality indicators provide information on the presence (or absence) of selected care processes and outcomes. Some indicators show change over time (called ‘incidence measures’), while others represent status at a point in time (called ‘prevalence measures’). Information is calculated at the resident level and aggregated to represent care within a given facility. At the resident level, quality indicators are defined as the presence or absence of the condition, based on data from the most recent MDS assessment. For

---

Table 1. Quality indicator domains

<table>
<thead>
<tr>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidents</td>
</tr>
<tr>
<td>Behavioural and emotional patterns</td>
</tr>
<tr>
<td>Clinical management</td>
</tr>
<tr>
<td>Cognitive functioning</td>
</tr>
<tr>
<td>Elimination and continence</td>
</tr>
<tr>
<td>Infection control</td>
</tr>
<tr>
<td>Nutrition and eating</td>
</tr>
<tr>
<td>Physical functioning</td>
</tr>
<tr>
<td>Psychotropic drug use</td>
</tr>
<tr>
<td>Quality of life</td>
</tr>
<tr>
<td>Sensory function and communication</td>
</tr>
<tr>
<td>Skin care</td>
</tr>
</tbody>
</table>

Copyright © 2003 John Wiley & Sons, Ltd. 

a single facility, the quality indicator is defined as the proportion (percent) of residents with the quality indicator condition. These facility level quality indicators can be used to compare any given facility with others or with nursing home population norms.

Quality indicators capture both processes and outcomes of care. Process indicators represent the content, actions and procedures invoked by the provider in response to the assessed condition of the resident. Process quality includes those activities that go on within and between health professionals and residents. Outcome indicators represent the results of the applied processes, as inferred from resident status. Outcome quality addresses questions of how the resident fared as a consequence of the provision of care, i.e. whether the resident improved, remained the same, or declined. The distinction between a process and outcome quality indicator is not always straightforward. In some cases, the quality indicator is a combination of an outcome and a process, in that it reflects both of them. An example is the quality indicator for the presence of symptoms of depression (outcome) with no treatment (process) indicated. In other cases, the quality indicator can be considered either an outcome or a process measure, depending on one’s perspective. This is illustrated by the quality indicator ‘little or no activity.’ This quality indicator can be considered to reflect the status (outcome) of the resident (i.e. the resident is not able to or chooses not to engage in activities). Alternatively, it may be understood as a process quality indicator (i.e. the facility staff elects not to provide or arrange for the activities).

**Adjusting the indicators for resident risk**

Some quality indicators have associated ‘risk adjustment factors’ that improve the ability to make fair comparisons across residents or facilities. An important issue in developing measures of quality is the need to adjust for variation in the risk of negative outcomes. We conceptualised risk as the probability that, given a particular combination of health or functional factors, or to systematically differentiate the quality indicator into high and low risk populations. This is one reason that we have risk adjusted only a few of the MDS QI’s we developed.

**Choosing risk factors**

The challenge in selecting risk factors is to identify the important clinical elements that can contribute to increased risk, without erroneously including elements that should not be used to develop quality indicators for quality assurance purposes. Factors that systematically increase the risk of the condition for the resident, and over which the facility has little control or ability to intervene, are not themselves measures or reflections of poor quality, should be included as risk factors. A serious problem arises, however, if risk factors used for adjustment are, themselves, a function of poor care quality or if they represent problematic care practices. For example, use of physical restraints relates to falls and other injuries. Yet, excessive use of restraints is a reflection of poor care practices. Including restraint use as a risk factor for the prevalence of falls would seriously bias facility comparisons because potentially important quality differences would be adjusted out of the model. In addition, one must guard against including factors that may contribute to increased risk, but over which the facility has the ability to intervene to reduce the risk of the QI condition even if the resident is at higher risk because of the presence of the risk factor. We call this phenomenon ‘intervention potential’. If the facility can be expected to identify the risk and take steps (interventions) to reduce the probability of the QI condition in the resident, than it would be inappropriate to include those elements as risk factors, or to systematically differentiate the quality indicator into high and low risk populations. This is one reason that we have risk adjusted only a few of the MDS QI’s we developed.

**Choosing the appropriate method of risk adjustment**

Most studies of long-term care quality have used statistical methods of risk adjustment, such as multivariate models or standardisation (Zinn et al., 1993; Shaughnessy et al., 1995; Berlowitz et al., 1996). A statistical approach offers the advantages of producing a single number (e.g. standardised rate, or difference or ratio between observed and expected rates) to
represent the care of each facility relative to others. The multivariate statistical model, on the other hand, may not deal well with interactions among risk factors or between risk and the care outcome (Thomas et al., 1993). In addition, clinical staff and other users (e.g. regulators) may not fully understand methods of statistical adjustment, which in turn may inhibit use of risk-adjusted measures and impede the quality assessment process.

After considering various statistical risk adjustment techniques, we decided to use a stratification approach. We stratified residents into high and low risk groups and calculated QI rates within each stratum. We then were able to draw inter-facility comparisons based on QI rates within their high or low risk resident populations. Stratification offers several advantages. First, it is a relatively simple and straightforward process that those who do not have extensive training in epidemiology or multivariate statistics can understand. Second, the focus on high or low risk may aid in targeting resident review for quality of care problems. Third, the comparison of rates between strata can yield information about potentially important interactions between risk and the quality of care provided in a facility. For example, some facilities may be quite competent at treating low risk residents but fail to have the specialised care required for the high risk resident. Finally, we have presented evidence (Karon and Zimmerman, 2001) that the stratification method of risk adjustment may be methodologically superior to other methods in maximizing the difference in facility distributions between unadjusted and adjusted rates.

THE CHSRA MDS QUALITY INDICATORS

The product of the development process is a set of 24 Quality Indicators, based on resident level data from assessments completed of residents using the Minimum Data Set Version 2.0 (ref). These indicators represent 11 of the original 12 domains of care. The 24 quality indicators are presented in Table 2, which also classifies each quality indicator as process or outcome, and whether the quality indicator has associated risk factors.

Table 2. Quality indicators (version 6.2), defined on basis of MDS 2.0 with partial quarterly assessments

<table>
<thead>
<tr>
<th>Domain</th>
<th>Quality indicators</th>
<th>Process/Outcome</th>
<th>Risk adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidents</td>
<td>Incidence of new fractures</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Prevalence of falls</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td>Behavioural and emotional patterns</td>
<td>Prevalence of behavioural symptoms affecting others*</td>
<td>Outcome</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Prevalence of symptoms of depression*</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Prevalence of symptoms of depression* without antidepressant therapy</td>
<td>Both</td>
<td>No</td>
</tr>
<tr>
<td>Clinical management</td>
<td>Use of nine or more different medications</td>
<td>Process</td>
<td>No</td>
</tr>
<tr>
<td>Cognitive patterns</td>
<td>Incidence of cognitive impairment*</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td>Elimination and continence</td>
<td>Prevalence of bladder/bowel incontinence</td>
<td>Outcome</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Prevalence of occasional bladder/bowel incontinence</td>
<td>Both</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Prevalence of indwelling catheters</td>
<td>Process</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Prevalence of fecal impaction</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td>Infection control</td>
<td>Prevalence of urinary tract infections</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td>Nutrition and eating</td>
<td>Prevalence of weight loss</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Prevalence of tube feeding</td>
<td>Process</td>
<td>No</td>
</tr>
<tr>
<td>Physical functioning</td>
<td>Prevalence of dehydration</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Prevalence of bedfast residents</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Incidence of decline in late loss ADLs</td>
<td>Outcome</td>
<td>No</td>
</tr>
<tr>
<td>Psychotropic drug use</td>
<td>Prevalence of antipsychotic use in the absence of psychotic and related conditions*</td>
<td>Process</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Prevalence of antianxiety/hypnotic use*</td>
<td>Process</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Prevalence of hypnotic use more than two times in last week*</td>
<td>Process</td>
<td>No</td>
</tr>
<tr>
<td>Quality of life</td>
<td>Prevalence of daily physical restraints*</td>
<td>Process</td>
<td>No</td>
</tr>
<tr>
<td>Skin care</td>
<td>Prevalence of little or no activity*</td>
<td>Either</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Prevalence of stage 1–4 pressure ulcers</td>
<td>Outcome</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Indicators of particular interest in Old Age Psychiatry.
Validation of the quality indicators

It is critically important to conduct studies of the accuracy and validity of any quality measures. However, because of funding cutbacks on the aforementioned national demonstration that led to their development, the indicators, only a limited validation study of the quality indicators could be undertaken prior to their application in the quality assurance process (Karon and Zimmerman, 1996). Findings from the validation study showed, first, that the quality indicators have a high degree of accuracy, or reliability. Average facility accuracy rates for the Quality Indicators ranged from 72% to 95%. The findings also reveal that the Quality Indicators have reasonably high predictive power at higher threshold levels: if a facility flagged at the 90th percentile, the probability that follow-up review found a problem with care is almost 70%, while the corresponding probability at the 95th percentile rises to 88%. In general, the validation study findings showed that the Quality Indicators are useful tools for identifying quality problems related to all aspects of the care process (i.e. assessment, care planning, implementation, and monitoring of care).

Quality indicators versus quality measures

One of the most critical points that must be emphasized in using the MDS data for quality assurance purposes is that the quality indicators are just that: Indicators of potential quality problems. They are not measures of quality. Measures of quality identify aspects of care where there definitely is a problem. Quality measures are their own end points; they do not require further investigation to make judgments about the quality of care. Quality indicators, by contrast, provide useful information as the starting point for a process of evaluating the quality of care through careful investigation. The final decision of whether or not there is a quality problem, and the nature of that problem, requires careful and skilled investigation by clinical experts.

There are situations in which quality measures might be more desirable than quality indicators. However, a valid and reliable quality measure requires clear agreement as to the acceptable level of outcomes, and the circumstances under which an undesirable outcome would be tolerated. The latter also requires detailed information about those circumstances. At this time, none of these conditions can be met in using the MDS Quality Indicators, or any other ones, for that matter. There is no consensus on the acceptable standards of care.

There are advantages to quality indicators over quality measures. By following up the data-based indicators with clinically based investigation, it is possible to identify not only the existence of a quality problem, but also the source of that problem. This is key to developing a plan for quality improvement.

Using the quality indicators in quality assurance and quality improvement

Quality indicators have several possible applications. They can be used as part of an external quality assessment or review process; as part of a provider’s internal quality improvement activities; as the basis of research into care practices; as a source of consumer information; and to help guide policy makers. In the remainder of this paper we focus on the first two of these applications, both of which are based on the ability to compare a facility’s performance on key indicators with that of their peers or other standards.

National Automated Quality Indicator System in the US

The National Automated Quality Indicator System is the best example of the use of the MDS Quality Indicators in a quality assurance process. It is the system currently in use in the USA. Researchers at CHSRA developed a set of quality monitoring reports to complement the QI’s that can be used by external and internal quality assurance staff. These and resident level of analysis enable the reviewer to compare the facility with similar facilities; and at the resident level, identify those who have specific conditions reflected in the QI’s.

Table 3 presents an excerpt of a sample Facility Quality Indicator Profile. This report shows the number of residents who have the condition represented by the QI, the number of residents who could have had the condition, the percentage of facility residents who have the condition, the average percentage of residents who have the condition in the peer group facilities, and the corresponding percentile rank of the subject facility. In addition, there is a visual flag shown in the last column if the facility exceeds the threshold value for that Quality Indicator. In Table 3, the facility has a much higher (than the peer group) proportion of its residents with symptoms of depression, and symptoms of depression with no evidence of antidepressant therapy. These two, related, indicators, would appear to warrant further review to determine whether the facility has a care problem in this area.
may be, for example, that the facility staff is not ade-
quately identifying and diagnosing depression symp-
toms in the residents, and therefore is not adequately
treating those residents for their depression.

Table 4 presents an excerpt from a sample Resident
Quality Indicator Summary. It shows, for each resi-
dent, the specific QI on which the resident flags (i.e.
the resident has the condition identified in the QI),
and, if the resident flagged, whether he/she was at
high or low risk for the QI condition. This report
can be used to identify specific residents who would
be good candidates to further review a particular area
of care.

CHSRA has made these reports available via the
Internet to every nursing home in the United States,
and to the regulatory (survey) agency in each state.
This accessibility enables the reports to be used for
both external (regulatory) and internal (by the home)
quality assurance and monitoring activities.

**CHSRA Provider Initiative Program**

Subsequent to the development of the MDS Quality
Indicators, and the reporting system and software to
implement them, researchers at CHSRA have imple-
mented a project to assist providers in using the QI’s
for quality improvement. Called the Provider Initia-
tive Project, this effort has offered nursing home staff
assistance in understanding and interpreting the qual-
ity indicators, as well as a vehicle for submitting MDS
data and receiving reports on the Quality Indicators.
In addition, supplementary materials such as specific
QI protocols to use in reviewing care areas that flag on
the QI reports are provided to participating nursing
homes. This initiative was implemented prior to the
availability of QI reports to all nursing home through
the aforementioned National QI Automated System.
The fact that the vast majority of member nursing
homes have continued to participate in the project
even after the reports became available through the
National System is testament to the interest in receiv-
ing supplemented QI information and assistance
in using it. Currently there are approximately 400
nursing homes participating in this project. More gen-
erally, the emphasis on quality and outcomes manage-
ment, as well as the managed care movement, in the
United States, has led to the increased use of MDS
based performance measures by managed care orga-

isations and private consultant firms in the long term
care area. Outcome based performance measures are
more and more the cornerstone of quality improve-
ment efforts, both in nursing homes and in other long
term care settings.

**Conclusion and next steps**

The availability of the MDS, a standardised, routine
resident assessment tool, has made possible the de
velopment of resident-based quality indicators. These
indicators provide important information that can be
used for many purposes, including internal quality
improvement initiatives. The universal availability of
the CHSRA MDS Quality Indicators to all nursing
homes and all state regulatory agencies in the United
States, and their extensive use in both external and
internal quality assurance functions is testament to
the long term popularity and viability of resident
based performance measures.

---

Table 3. Nursing home quality indicators profile; facility name: A B C Manor; Report period: 7/1/99 to 12/31/99

<table>
<thead>
<tr>
<th>Domain/Quality indicator</th>
<th>Number with QI</th>
<th>Number in denom</th>
<th>Facility percentage</th>
<th>Peer group percentage</th>
<th>Percentile rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flag</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accidents</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Incidence of new fracture</td>
<td>1</td>
<td>79</td>
<td>1.3%</td>
<td>1.8%</td>
<td>40</td>
</tr>
<tr>
<td>2. Prevalence of falls</td>
<td>14</td>
<td>79</td>
<td>17.7%</td>
<td>13.3%</td>
<td>81</td>
</tr>
<tr>
<td>3. Prevalence of behavioral symptoms</td>
<td>21</td>
<td>79</td>
<td>26.6%</td>
<td>21.2%</td>
<td>76</td>
</tr>
<tr>
<td>High risk</td>
<td>19</td>
<td>56</td>
<td>33.9%</td>
<td>26.4%</td>
<td>79</td>
</tr>
<tr>
<td>Low risk</td>
<td>2</td>
<td>23</td>
<td>8.7%</td>
<td>10.2%</td>
<td>58</td>
</tr>
<tr>
<td>4. Symptoms of depression</td>
<td>23</td>
<td>79</td>
<td>29.1%</td>
<td>15.1%</td>
<td>91</td>
</tr>
<tr>
<td>5. Symptoms of depression without antidepressant therapy</td>
<td>13</td>
<td>79</td>
<td>16.5%</td>
<td>7.9%</td>
<td>93</td>
</tr>
<tr>
<td><strong>Clinical management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Use of 9+ medications</td>
<td>22</td>
<td>79</td>
<td>27.8%</td>
<td>27.6%</td>
<td>52</td>
</tr>
<tr>
<td><strong>Cognitive patterns</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Onset of cognitive impairment</td>
<td>1</td>
<td>24</td>
<td>4.2%</td>
<td>10.3%</td>
<td>19</td>
</tr>
</tbody>
</table>
Other important unfinished extensions of this concept have been identified in this article. First, there are other audiences for whom the Quality Indicators, and nursing home performance measures more generally, can be extremely valuable. Perhaps of greatest potential value is the systematic use of such measures by nursing home residents, their families and informal caregivers, consumers, and advocates for nursing home residents. Use of this information can enhance the ability of these groups to make more informed decisions about the selection of a formal caregiver, and to more effectively monitor the care provided in nursing homes.

With respect to provider initiatives, there is substantial evidence that the indicators are especially helpful in the first phase of those initiatives in which the potential care problems are identified and analysed as to their magnitude and nature. This article has focused on that first phase: the identification, confirmation, and analysis of care problems. Quality indicators can help to identify potential care areas to focus on, identify specific residents to key on in the review and investigation process, assess the resulting magnitude and the nature of the care problem, and provide a structure and organising framework for that process.

There is much more to do in the second phase. A systematic response to the identified problems is needed. The CHSRA database of quality indicators can be used to identify facilities that appear to offer best practice models. Other sources of assistance are available and internally, focus groups of staff, as well as residents and family members, can formulate strategies to serve as the basis for quality improvement projects. The availability of universal data from a standardised assessment tool can also facilitate progress in clinical care practices through more robust epidemiological studies. Such data bases can assist in the development of more valid and useful performance measures, and in the studies to more effectively link these outcomes to processes of care. Quality Indicators based on resident assessment data, in summary, have enormous potential for improving care by providing better information to a variety of users, including regulators, providers of care, consumers, and the research community.

REFERENCES

Med Care Rev 48(2): 129–166.

Donabedian A. 1980. Methods for deriving criteria for assessing the 

Institute of Medicine. 1986. Improving the Quality of Care in Nur- 

Karon SL, Zimmerman DR. 1996. Using indicators to structure 
quality improvement initiatives in long-term care. Qual Manag 

Case Mix 2001 Conference. Niagara Falls, Ontario, Canada, 29 

Morris JN, Murphy K, Nonemaker S. 1995. Long Term Care Facil- 
Version 2.0. Health Care Financing Administration: Baltimore, 
MD.

Shaughnessy PW, Kramer AM, Hittle DF, Steiner JF. 1995. Quality 
of care in teaching nursing homes: findings and implications. 


Zinn JS, Aaronson WE, Rosko MD. 1993. Variations in the out- 
comes of care provided in Pennsylvania nursing homes. Facility 