Measures, Indicators, and Improvement of Quality of Life in Nursing Homes:
Final Report: Volume 1

Submitted to Centers for Medicare & Medicaid Services
by Division for Health Services Research and Policy,
School of Public Health, University of Minnesota
Rosalie A. Kane, Principal Investigator
Mary Pratt, Project Officer
Karen Schoeneman, Associate Project Officer

June 2004

Researchers
University of Minnesota
Rosalie A. Kane, PhD
Robert L. Kane, MD
Boris Bershadsky, PhD
Lois J. Cutler, PhD
Katherine Giles, MS, MSN
Research Assistants: Jiexin A Jason@ Liu, Kyoungrae Kang, Lixin Zhang

St. Cloud State University
Kristen C. Kling, PhD

University of Pittsburgh
Howard B. Degenholtz, PhD

This report is a product of the project: Measures, Indicators, and Improvement of Quality of Life in Nursing Homes (RFP: HCFA-98-002/PK), which was conducted from May 1, 1998 to July 31, 2003 under Master Contract # 500-96-0008 between the Centers for Medicare & Medicaid Services (CMS) and the University of Minnesota. Robert L. Kane is the director of the Master Contract, and Rosalie A. Kane, the project director. The views in the report are those of the researchers and not necessarily those of CMS or the project officers. M. Powell Lawton, PhD, Philadelphia Geriatric Center contributed to greatly to this work and was a co-author of early interim reports before his death in 2001. An draft version was submitted to CMS in march 2004, and this revision responds to CMS comments. For more information, contact Rosalie A. Kane at the Division of Health Services Research & Policy, School of Public Health, University of Minnesota, 420 Delaware St., SE, MMC 197, D-527 Mayo Building, Minneapolis, MN 55455, phone 612-624-5171, fax 612-634-5434, and email, kanex002@umn.edu.
**Preface**

In 1998, the Centers for Medicare & Medicaid Services (CMS), then the Health Care Financing Administration, contracted with the University of Minnesota to perform work in a project called: *Measures, Indicators, and Improvement of Quality of Life in Nursing Homes*. The project’s major objectives were twofold: 1) develop and test measures and indicators of quality of life in nursing homes; and 2) study how the physical environments in nursing homes affect that quality of life.

Each major objective entailed many specific tasks and analyses, and two waves of large-scale data collection were conducted to develop and test the quality of life measures themselves. The purpose of this report is to gather in a single report a description of all the methods and results from this multifaceted 5-year study.

The authors are indebted to the project officer, Mary Pratt, for her unfailing helpfulness during this study, as well as to Karen Schoeneman, who served as an additional project officer with special emphasis on the applicability of the work to the nursing home survey and certification process. As always, the conclusions are not necessarily those of CMS or its project officers.

The authors also acknowledge the extraordinary contributions of M. Powell Lawton, PhD Philadelphia Geriatric Center, who worked on this project from its inception. His untimely death in January 2001 prevented most of the results and interpretations presented here to be informed by his involvement.

Rosalie A. Kane, PhD  
Division of Health Services Research & Policy  
School of Public Health  
University of Minnesota  
June 2004
# Table of Contents

## Volume 1

### Executive Summary
Introduction
Field work methods
Wave 1
Wave 2
Transferability study
Data collection procedures
Resident self-report measures
Family and staff proxies for resident QOL
Resident personality
Facility-level QOL data
Shortened QOL screeners
Facility level protocols to observe staff and resident interactions
On-site potential indicators
Off-site external indicators
Transferability
Physical environments
Conclusions, Implications, and Recommendation

### Chapter 1: Introduction
General objectives
Scope and significance
Why focus on QOL
Significance of environmental studies
Expected users of QOL measures and indicators
Survey and certification personnel
Provider
Consumers, consumer advocates, and purchasers
Other group care settings
Assumptions
Emphasis on psychological and social components of QOL
Inclusions and exclusions of residents
Exclusions of facilities
Residents as gold standard
Need to supplement resident self-report
Multiple sources of information
Dimensionality of QOL
Measures and indicators defined
Organization of the report
References

### Chapter 2: General methods
Develop and test measures and indicators
Research tasks and questions
Two waves of data collection strategy
Wave 1
Interim data collection
Wave 2 data collection
Chapter 5: Personality and quality of life ................................................................. 5.1
Development of the measures ........................................................................ 5.2
Approach ........................................................................................................ 5.2
Pilot Study ........................................................................................................ 5.3
Wave 2 large-scale application ........................................................................ 5.6
Relationship between QOL and personality .................................................... 5.10
Areas for continued investigation .................................................................. 5.11
Concluding comments .................................................................................... 5.12
References ...................................................................................................... 5.13

Chapter 6: Patterns of quality of life in facilities ................................................ 6.1
Background ..................................................................................................... 6.1
Methods .......................................................................................................... 6.3
Data ............................................................................................................... 6.3
Analysis ......................................................................................................... 6.4
Results ........................................................................................................... 6.5
Wave 1 .......................................................................................................... 6.5
Wave 2 findings ............................................................................................. 6.12
Facility effect size .......................................................................................... 6.15
Discussion ..................................................................................................... 6.17
References .................................................................................................... 6.20

Chapter 7: Development of short quality of life screeners ............................... 7.1
Issues ............................................................................................................. 7.1
Data collection circumstances ......................................................................... 7.1
Response formats .......................................................................................... 7.2
Summary of Shortened Scales ......................................................................... 7.5
34-item and 14-item multidimensional instruments ........................................ 7.8
Goal ............................................................................................................... 7.8
Step 1. Develop brief multidimensional instrument using Likert and interpolated binary responses ................................................................. 7.8
Step 2. Test the local optimality (goodness) of the obtained instrument using the same sample .......................................................... 7.10
Step 3. Test the 34-item instrument using a larger sample ............................... 7.11
Step 4. Test the dichotomized instrument using the large scale (1219 Cases) ......................................................................................... 7.11
Step 5. Test discriminative power of the original and dichotomized domain scores ............................................................................... 7.14
Step 6. Test the Dimensional Structure of QOL-MD14 using the large sample ......................................................................................... 7.14
# Table of Contents

Developing a Short Uni-Dimensional QOL Scale ......................................................... 7.17
Goal ................................................................................................................................. 7.17
Approach ......................................................................................................................... 7.18
Results ............................................................................................................................... 7.22
Adding Dignity: QOL-16 .............................................................................................. 7.25
Discussion .......................................................................................................................... 7.26

Chapter 8: Facility-wide observational approaches .................................................... 8.1
Approach .......................................................................................................................... 8.1
Wave 1 Protocols ........................................................................................................... 8.2
  Measures ....................................................................................................................... 8.2
  Data collection ............................................................................................................. 8.3
Wave 2 protocols ........................................................................................................... 8.4
  Transferability .............................................................................................................. 8.5
Analyses ............................................................................................................................ 8.6
Scale-Level Results ....................................................................................................... 8.7
Wave 1 Frequencies ....................................................................................................... 8.7
Wave 1 Scale-Level Analysis ......................................................................................... 8.10
Streamlining the Tool for Wave 2 ................................................................................ 8.12
  Item-level analyses ....................................................................................................... 8.13
  Combined-items analyses ............................................................................................. 8.13
Wave 2 Frequencies ....................................................................................................... 8.15
Results of Scale-Level Analyses, Wave 2 .................................................................... 8.16
Transferability Study Changes ...................................................................................... 8.17
Transferability Study Frequencies ................................................................................ 8.18
Transferability Study Scale Results .............................................................................. 8.19
Cross Administration Item Analysis ............................................................................. 8.20
Discrimination of Observation Items across Facilities ................................................. 8.23
Conclusions .................................................................................................................... 8.28

Chapter 9. Potential QOL indicators from on-site data collection ............................... 9.1
Methods ........................................................................................................................... 9.1
Data collection ................................................................................................................ 9.1
  Wave 1 ......................................................................................................................... 9.1
  Wave 2 ......................................................................................................................... 9.3
Data Elements ............................................................................................................... 9.3
  Wave 1 ......................................................................................................................... 9.3
  Wave 2 ......................................................................................................................... 9.6
Analysis ........................................................................................................................... 9.6
Data collection and sample ............................................................................................ 9.7
Descriptive findings ........................................................................................................ 9.7

Chapter 10: Relationship of quality of life and indicators from extant data ................ 10.1
Variables ......................................................................................................................... 10.1
  Resident Factors from MDS Data .............................................................................. 10.1
  Nursing Home Quality Indicators from MDS Data ..................................................... 10.2
  Facility Factors from OSCAR Data ............................................................................ 10.2
  Deficiencies Related to QOL from Survey ................................................................. 10.3
Analysis ........................................................................................................................... 10.4
Findings ........................................................................................................................... 10.5
Conclusions .................................................................................................................... 10.11
References ..................................................................................................................... 10.13
Chapter 13: Conclusions, Implications, and Recommendations

Summary of major findings: ................................................................. 13.1
Implications ....................................................................................... 13.1
Recommendations ............................................................................. 14.14

Tables and Figures

Figure 2.1. Cognition Measure used for Sampling Residents ....................................................... 2.16
Figure 2.2. Algorithm for selecting residents for the sample in each facility .............................. 2.18
Table 2.1. Comparison of Wave 1 and Wave 2 ........................................................................ 2.3
Table 2.2. QOL Facility Survey Results. .................................................................................... 2.10
Table 2.3. Distribution of NH in Sample by State and Number of Units .................................. 2.15

Figure 3.1. Domain loadings on overall QOL based on the second order confirmatory factor analysis of the short scales ................................................................. 3.29
Figure 3.2. Confirmatory Factor Analysis, Wave 2. 11 Domains with cases who answered all 53 questions (959 cases) ................................................................. 3.42
Table 3.1. Specification of QOL Domains .................................................................................. 3.11
Table 3.2. Number of Items Per Long Domain Scale ................................................................. 3.18
Table 3.3. Distribution of Cognitive Scores in Overall Sample ................................................... 3.19
Table 3.4. Description of Sample by Scale Completion for Long Scales (in Percents) ............... 3.21
Table 3.5. Long Scales: Scale Reliability by Cognition Level ..................................................... 3.22
Table 3.6. Percent of Useful Respondents by Different Completeness Rules ......................... 3.23
Table 3.7. Long Scales: Mean Z-Scores of Residents by Cognition .......................................... 3.24
Table 3.8. Summary Score Correlations for Individual Residents ............................................. 3.25
Table 3.9. Regressions to Predict Scale Scores Using Domain Summary Items ....................... 3.26
Table 3.10. Long Scales: Regression of Domains with “Life as a Whole” by Cognitive Status ...................................................................................................................... 3.27
Table 3.11. Standardized Regression Coefficients of Observed Variables on Latent QOL Factors ................................................................. 3.30
Table 3.12. Reliability of Domain Scores by Cognitive Function .............................................. 3.33
Table 3.13. Correlations Among Domain Scores for Short Wave 1 Scales ................................ 3.34
Table 3.14. Correlations Between QOL Scales and Emotions by Cognition Group ............. 3.35
Table 3.15. Correlations Between QOL Scales and Global Satisfaction by Cognition Group .... 3.36
Table 3.16. Characteristics of Wave 2 Sample ............................................................................. 3.40
Table 3.17. Correlations among domains: Wave 2 ..................................................................... 3.41
Table 3.18. Regression to Predict Scale Wave 2 Scores Using Summary Items for the Domains ................................................................. 3.43

Table 4.1. Studies Evaluating Proxies for QOL Measures ........................................................... 4.4
Table 4.2. Comparison of Mean QOL Values by Respondent Group ........................................ 4.12
Table 4.3. Correlations Between Resident and Staff Proxies ...................................................... 4.13
Table 4.4. Correlations Between Resident and Family Proxies .................................................. 4.14
Table 4.5. Correlations Between Proxies and Residents for Summary Items ............................ 4.15
Table 4.6. Correlations Between Proxies and Residents for Emotion Items ......................... 4.16
Table 4.7. Regression Coefficients for Resident Ratings by Domain: Residents Vs. Staff ....... 4.17
Table 4.8. Resident Coefficients for Resident Ratings by Domain: Residents Vs. Family .......... 4.18
Table 4.9  Correlations of Facility Level Domain Scores between Residents and Proxies

Table 5.1  Descriptive Statistics and Factor Analysis Results for the Original BFI
Table 5.2  Scale Qualities for 27-item Version of the BFI
Table 5.3  Percentage of Respondents Choosing Likert-type Responses by Cognition
Table 5.4  Descriptive Statistics and Factor Analysis Results for the 25-item BFI in Wave 2
Table 5.5  Scale Qualities for 25-item Version of the BFI
Table 5.6  Regression results prediction QOL using cognitive and physical functioning and personality

Table 6.1  Wave 1 Facility Characteristics (N=40)
Table 6.2  QOL Domain Alpha Values and Facility Scores
Table 6.3  Facility-Level Deviations in Resident-Report QOL (Risk-Adjusted)
Table 6.4  Ability of Various Components of QOL to Differentiate Facilities (Non-Adjusted and Adjusted for Residents’ Characteristics)
Table 6.5  Ability of Various Components of QOL to Differentiate Facilities (Adjusted for Residents’ Characteristics and Allocation of Interviewers)
Table 6.6  Effect of Length of NH Stay on Domain Scores at Wave 1
Table 6.7  Wave 2 Facility Characteristics
Table 6.8  Facility Risk-adjusted Performance Summary at Wave 2
Table 6.9  Effect of Length of NH Stay on Domain Scores–Wave 2
Table 6.10  Sample Size Needed to Detect A Mean Difference Across Facilities: Equal to Different Levels of Between-Groups Standard Deviation at Wave 1
Table 6.11  Sample Size Needed to Detect a Mean Difference Across Facilities: Equal to Different Levels of Between-Groups Standard Deviation at Wave 2

Figure 7.1  Facility Average QOL-14 Scores (Wave 2)
Table 7.1  Domain Structure of Three Shortened Scales
Table 7.2  Comparison of Items in 3 Shortened QOL Scales
Table 7.3  Factor analysis for 955 Wave 2 Cases for Likert Responses with no Missing Items
Table 7.4  Factor Analysis of Wave 2 Data Interpolating Binary with Likert Responses for 1292 Cases
Table 7.5  Factor Analysis of Wave 2 Data with “Dichotomization” of Likert Items for 1291 Cases
Table 7.6  Mixed-Effect Model
Table 7.7  Dimensional Structure of 14-Item 4-Factor Scale (QOL-MD14) With Dichotomized Responses
Table 7.8  Number of Homogeneous Subgroups for each Domain at each wave
Table 7.9  Items in the QOL-14
Table 7.10  Properties of Scale Versions at Wave 1 and Wave 2
Table 7.11  Correlations of QOL-14 with QOL-MD14
Table 7.12  Correlations of New Scales with Original. Domain Scores
Table 7.13  Distribution of Facility Average QOL-14 Scores

Figure 8.1  Items Correlated with Overall QOL in each Wave 1 Observation
Table 12.2. Composite Indices and Frequency of Index Items at the Room Level ..................................12.18
Table 12.3. Composite Indices and Frequency of Index Items at the Unit Level.....................................12.19
Table 12.4. Composite Indices and Frequency of Index Items at the Facility Level................................12.21
Table 12.5. One-Way ANOVA on Composite Scale Mean Differences Between Room Types ...........................................................................................................12.24
Table 12.6 Light Levels .................................................................................................................................12.29
Table 12.7 Distribution of Clusters .................................................................................................................12.34
Table 12.8 Descriptive Statistics for Clusters ........................................................................................................12.34
Table 12.9 Internal Facility Attributes Associated With Cluster Membership........................................12.36
Table 12.10 Internal Unit Attributes Associated with Cluster Membership .................................................12.38
Table 12.11 Internal Room Attributes Associated With Cluster Membership........................................12.40
Table 12.12 Average QOL by Cluster .............................................................................................................12.45
Table 12.13 Prevalence of Private Rooms and Number of Roommates .........................................................12.47
Table 12.14 Effect of Private Room and Number of Roommates on QOL .....................................................12.48

Volume 2
Appendices

Wave 1 Material
A. Survey of Facilities in Wave 1 Catchment Areas
B. Resident Interview, Wave 1
C. Staff Interview about Resident and Staff Contact Form
D. Family Questionnaire about Resident and Family Contact Form
E. Resident-Level Protocol for Observation of Resident Affect
F. Facility-Level Observation of Resident and Staff Interactions, Wave 1
G. Environmental Checklist: Room and Bath
H. Environmental Checklist: Nursing Unit
I. Environmental Checklist: Facility Level
J. Administrative Interview and Archival Information
K. Nursing Interview
L. Social Work Interview
M. Activities Interview
N. Summary Indicator Document
O. Overall Interviewer Rating

Wave 2 Materials
P. Resident Interview, Wave 2
Q. Observation of Staff and Resident Interactions, Wave 2
R. Administrative Questionnaire, Wave 2
S. QOL Scales Scoring Document

Transferability Materials
T. Resident Interview for the Transferability Study
U. Observation of Resident and Staff Interactions for the Transferability Study
V. Training Material for Transferability Observations
W. Focus Group Guide
X. Published articles from QOL project
