Measuring the Quality of Care Provided to Dually Enrolled Medicare and Medicaid Beneficiaries Living in Nursing Homes

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Abstract

Objectives—To adapt the Assessing Care of Vulnerable Elders project nursing home (NH) specific quality indicators (QIs), for use with routinely collected data, and to evaluate which clinical conditions and types of care were inadequately measured using these data sources.

Design—Retrospective cohort study.

Setting—Nursing homes.

Participants—NH residents 66 years of age and older dually enrolled in Medicare and Medicaid in 19 California counties between 1999 and 2000.

Measurements—Identification of care inaccessible to measurement by Medicare and Medicaid claims linked to the Minimum Data Set (MDS). Assessment of care provided for measurable QIs by condition (eg, heart failure) and by intervention type (eg, medication use).

Results—Only 50 of 283 QIs were captured using linked claims data. The 21,657 patients triggered 152,376 QIs (7.0 QIs/person). The overall QI pass rate (receipt of recommended care) for eligible participants was 76%. In this sample, QIs with the highest pass rates measured avoidance of adverse medications and appropriate medication use. Fewer than half of the QIs were

passed for ischemic heart disease, stroke, and osteoporosis. The MDS permitted assessment of 8 QIs that focus on geriatric care. No measured QIs assessed history taking or nursing care.

Conclusions—The use of claims data linked to MDS to measure the quality of care process measures is feasible for NH populations, but would be more valuable if additional data elements focused on geriatric and residential care. QIs that could be applied to patients in this study suggested areas of care needing improvement.

Keywords

long term care; geriatrics; quality of care; process of care; nursing home

Assessing and improving the quality of care for chronically ill older individuals living in institutional settings is increasingly important in the United States. Members of a growing frail older population reliant on publicly funded healthcare, often unable to speak for themselves, must be ensured to receive the care they need. Although the assessment of quality of care uses 3 types of measures–structure, process, and outcome[1]– historically, the national measurement of the quality of care delivered to nursing home residents has focused on facility-level measures of structure (eg, facility size, ownership, and staffing) and outcomes (eg, risk-adjusted adverse events). The Centers for Medicare and Medicaid Services use the minimum data set (MDS) to estimate and report on complication rates (eg, falls, fractures, and pressure ulcers) and prevalence of worsening patient status (eg, increasing need for ADL assistance).[2,3] Centers for Medicare and Medicaid Services also maintains the Online Survey, Certification, and Reporting database, which reports on nursing home characteristics and the health deficiencies issued by government inspectors during state surveys, broken out into 8 types of deficiencies in structure, process, and outcome occurring within the facility.[3]

In contrast, structured measurement of the delivery of specific processes of care is not generally performed at either the level of the individual or of the nursing home.[4] Efforts to measure the processes of care provided to older adults have been challenged by the lack of measures aimed at this population and difficulty with measurement.[4–6] The Assessing Care of Vulnerable Elders (ACOVE) set of quality indicators (QIs) was developed to measure processes of care delivered to vulnerable older patients.[7,8] QIs developed for community-dwelling geriatric patients were validated for use with administrative data,[9] and have been used to evaluate the care of a population of community-dwelling elders dually enrolled in Medicare and Medicaid.[10] Because QIs developed for a community-dwelling population might not directly be applicable for a nursing home (NH) population, a structured process was used to create a separate set of NH specific QIs for care provided to NH residents.[5,6,11] Experts in NH care identified these measures as valid for assessing quality. These NH QIs were developed to be measured by a combination of direct interview, chart review, and direct observation, but have not been adapted for use with secondary data sources.

The goals of the current study were to adapt the ACOVE NH QIs for use with routinely collected data, evaluate which clinical conditions and types of care were inadequately measured using these data sources, and describe the quality of care received by a population of NH patients. QIs were modified for use with Medicare and Medicaid fee-for-service

claims and the MDS. Characteristics of implemented and nonimplemented QIs were compared by condition and type of intervention. Care delivered to NH residents dually enrolled in Medicaid and Medicare in 19 California counties during a 2-year period, 1999 to 2000, was evaluated by individual quality indictor, by clinical condition, and by type of intervention.

METHOD

Quality Indicators

The ACOVE-1 QIs for NH residents consist of 283 explicit process of care measures defined across 24 conditions.[5,6,11] These QIs were developed through critical review of the literature and expert consensus.[5,6,11] Each QI is constructed with an "IF" statement that defines eligibility and a "THEN" statement that defines the care process that the patient should receive. For example, IF a cognitively intact NH resident who is capable of independent toileting has documented stress, urge, or mixed incontinence without evidence of hematuria or high postvoid residual, THEN behavioral treatment should be offered. The full set can be found in the Appendix, Supplemental Digital Content 1, http://links.lww.com/A892. Implemented QIs were maintained as closely as possible to the originally formulated QIs; however, to operationalize the NH QIs for use with claims and the MDS, some modifications were required. For example, claims and the MDS document receipt, but not intent, of care. Therefore, QIs that were designed to be satisfied, if an intervention was offered but refused, were modified to pass only if the intervention was received. In other circumstances, QIs were modified because the administrative data lacked clinical detail. For example, a QI that previously triggered only if a person had heart failure, with an ejection fraction of less than 40%, was modified to be triggered if a diagnosis of any heart failure was reported, potentially including individuals with heart failure due to diastolic dysfunction.

Study Sample

We assessed the care of individuals aged 65 years and older who were dually enrolled in Medicare and Medicaid and living in NHs during a 2-year period (1999–2000) in 19 California counties. Individuals were included in the study if they were residing in an NH for at least 5 of the last 6 months of 1998 and were alive on January 1, 1999.

Administrative Data Abstraction

Linked Medicare eligibility and claims data, Medicaid eligibility and claims data, and MDS 2.0 data, were drawn from the data archive maintained by the California Center for Long Term Care Integration, a joint research effort between the USC School of Gerontology and the UCLA Division of Geriatrics sponsored by the California Department of Health Services, Office of Long Term Care.[12] The California Center for Long Term Care Integration data archive contains Medicaid eligibility data and line item claims for aged, blind, and disabled persons enrolled between 1996 and 2000 in California's Medicaid program in 19 counties representing approximately half of the state's general population. Medicare eligibility data and line item claims were available for the subset of Medicaid

enrollees enrolled in Medicare. MDS data were available for individuals residing in NHs between 1998 to 2000.

Eligibility and performance for each NH QI was determined based on demographic data and diagnostic (ICD-9CM), procedural (ICD-9CM, CPT), and medication (NDC) codes reported in the Medicaid and Medicare eligibility files, fee-for-service claims, and the MDS admission, quarterly, and annual assessments. Medical diagnoses were considered as prevalent conditions if they were present for a patient at any time during a 3-year look back period (1996–1998). Medical diagnoses were considered as incident conditions if they were not present during the 3-year look back period but did occur during the study period (1999 and 2000). Coding for conditions is available on request.

Measuring Performance

A patient was eligible for a QI if information from the claims and MDS data satisfied the IF part of the QI. A performance score of 1 was assigned to the process measure if the patient received the care recommended in the THEN statement as documented in these data, otherwise, a score of 0 was assigned. QIs measured processes occurring throughout the 24-month study period. QIs that evaluated care that should be provided on an annual basis (such as annual eye exams for patients with diabetes) were measured only within the initial 12-month period. QIs were classified and tallied by condition group (eg, ischemic heart disease) and by process type (eg, procedure, medication, test, etc.). A description of each QI is available in the Appendix, Supplemental Digital Content 1, http://links.lww.com/A892.

Data Analysis

Eligibility and Performance—We tallied the number of QIs triggered by at least 1 patient, for each condition (eg, heart failure), and intervention type (eg, physical examination). Summary QI performance was calculated by summing the performance measure (1 or 0) for all persons eligible for that QI compared with the total number of eligible individuals. QI performance is reported as the total number passing divided by the total number eligible. Summary performance by condition and by intervention type are calculated and reported in a similar fashion. A number of implemented QIs have been grouped together in the condition group "medication use." These should not be confused with the similarly named intervention group "medication," which refers to medications as being the primary intervention measured by the QI.

Selected NH QIs were previously identified as being potentially inapplicable to patients with advanced disease states or situations, including advanced dementia, recognized poor prognosis, or do-not-hospitalize (DNH) orders.[5,6,13] A resident who would otherwise trigger these QIs is excluded from application of these QIs if s/he had such a condition or care order. In the current study, we assessed advanced dementia using the MDS-COGS measure for advanced dementia (MDS-COGS 5).[14] Poor prognosis was identified if a patient was identified in the MDS either as a hospice patient or as having less than 6 months to live, or if he or she had a Medicare or Medicaid claim for hospice care. Finally, DNH orders were identified from the MDS. QI exclusions are described in the online detailed table describing each QI.

RESULTS

Implementation of QIs With Administrative Data

A total of 50 of 283 ACOVE NH QIs could be measured with administrative data. Among these 50 QIs, 42 QIs could be computed with claims data alone, 4 QIs could be computed with MDS data alone, and 4 QIs could be computed from a combination of claims and MDS data. Some clinical conditions were better captured than others (Table 1). Medication use, depression, diabetes, heart failure, and vision care had the highest percent of QIs that could be measured with administrative data. No QIs could be defined for use with administrative data for 8 conditions: acute care services, continuity of care, hearing loss, pain management, pneumonia, pressure ulcers, residential care, and screening and prevention. Many QIs for measuring the quality of residential care were dependent on medical record, direct observation, or interview documentation of evaluation of problems identified through MDS screening or resident/proxy report.

QIs were classified into 15 types of interventions (Table 1). Most of the QIs (31/50) captured by administrative data were clustered in 2 types of interventions: medication use (20 QIs implemented of 69 medication use QIs) and laboratory tests (11 of 14 QIs). In contrast, 3 types of interventions—history (37 QIs), nursing procedures (11 QIs), and surgery (6 QIs) had no QIs captured by administrative data. Assistive devices (16 QIs), counseling (9 QIs), and complex procedures (7 QIs) each had only a single QI captured.

Cohort Demographics

A total of 21,657 older NH residents dually enrolled in Medicaid and Medicare in the 19 counties were eligible for study inclusion. The mean age of the study cohort in January 1999 was 84 years old with 69% of the patients 80 years or older (Table 2). Seventy-five percent were women. White non-Hispanics were the predominant racial/ethnic group (76%) with much smaller numbers of Blacks (9%), Latinos (8%), and Asians (5%). Nearly half of all residents in the sample were from 4 counties—San Diego, Alameda, Santa Clara, and San Bernardino. Mortality was high; 29% died in the first year of the study and 53% died within the 2 years of the study. Chronic disease was prevalent: atrial fibrillation (24%), depression (47%), dementia (80%), diabetes mellitus (34%), heart failure (47%), hypertension (71%), history of myocardial infarction (7%), and cerebrovascular disease (52%). Conditions that might lead to exclusion from selected QIs also were prevalent: 63% had advanced dementia, 5% had poor prognosis, and 14% had a DNH order written. Based upon eligibility data and MDS assessments, 50% of the Medicaid patients in nursing homes were dually enrolled. The dually enrolled individuals had greater rates of advanced dementia (63% vs. 44%) and DNH (12% vs. 8%), but slightly lower use of hospice (5% vs. 6%) compared with these enrolled in Medicaid alone.

Patients were cared for in 692 facilities. Most of these facilities were private for-profit (84%). Facilities were moderately sized— 65% had fewer than 100 beds and 3% had 200 or more beds. Most nursing homes were located in urban areas (95%). The mean number of registered nurse hours per patient was 0.57 for this sample.

QI Performance for Patients in the Cohort

The 21,657 residents in the test cohort were eligible for 152,376 QI care processes (mean, 7.0 QIs per person). The overall pass rate was 76.4%. The average number of QIs triggered for each patient was 7.1 (median: 6; SD: 2.8). On average, each patient triggered QIs for 4.7 different conditions and 3.2 different types of interventions. QIs that had the highest passing rates measured end-of-life care and avoidance of troublesome medications and interactions (Table 3). These included selection of antidepressant agents; avoidance of meperidine, barbiturates, and strongly anticholinergic medications when alternatives were available; and having an advance directive and receiving care consistent with specified treatment preferences. QIs with the lowest pass rates measured the diagnostic evaluation for new conditions. For example, only 11% of residents treated for new depression had a thyroid-stimulating hormone checked within a 1-year period and diagnostic testing for new heart failure occurred one-third of the time or less. Evaluation of left heart function after acute myocardial function occurred 63% of the time.

In general, ACE inhibition and β-blocker medications were used in about one-third of the cases in which they were recommended and only about one-fifth of patients with atrial fibrillation were anticoagulated. An exception to this was patients who were diabetic, nearly all of who were prescribed angiotensin-converting enzyme inhibitor medications. Most patients receiving warfarin met a minimum standard for frequency of checking anticoagulation, and most patients already receiving diuretics were followed-up as recommended, but patients newly started on angiotensin-converting enzyme inhibitor medication or diuretic medication were not. Timely eye exams for diabetic patients happened only 39% of the time and follow-up for diabetic patients with known proliferative retinopathy occurred with recommended periodicity less than 25% of the time. Timely pharmacologic treatment for depression occurred 12% of the time. See Table 2 for individual QI performance.

Eight conditions included 3 or more implemented QIs (Table 4). From these conditions, urinary incontinence measures, which were based on information drawn only from the MDS, had the best performance (95%). Perhaps because they focused on not doing unsafe things, medication use QIs had the next best performance (90%). End-of-life measures, which used MDS measures combined with claims-based information, demonstrated high performance (89%). Among the remaining conditions, only for diabetes care and hypertension were about half of the QIs passed. Fewer than one-quarter of the QIs were passed for ischemic heart disease and stroke. When classified by intervention type, medication management, dietary consultation, assistive device, and information continuity care processes were usually carried out as recommended. Laboratory testing and other simple diagnostic tests were received about half the time (Table 5).

Effect of Exclusions Rules

Exclusions for advanced dementia, poor prognosis, and DNH resulted in the nonapplication of 54,843 of 207,217 QIs that were triggered. Without exclusions, the overall pass rate would have been lower at 67.7% (140,191/207,217). When examined by condition, depression, end-of-life care, hospital care, and osteoarthritis had no exclusions, while only

2% of medication QI events were excluded. A large number of QIs were excluded from application from the remaining conditions, ranging from 39% for dementia care to 79% for urinary incontinence. Although overall pass rates by condition were generally not affected by exclusions, performance for hypertension, malnutrition, and vision, QIs had absolute improvements of greater than 5% after exclusions were applied. When classified by intervention type, information continuity, and physical examination, QIs had few exclusions, while assistive devices, surgery, simple testing, and physical therapy had the greatest percentage of exclusions. For these interventions, QI performance was higher after exclusions for medication, laboratory testing, and referral interventions.

DISCUSSION

Despite the existence of a large set of QIs for older NH patients, and the availability of a wide variety of administrative data including utilization information, procedure and diagnosis codes, pharmacy information, inpatient claims, and the MDS, only 50 of 283 QIs from the ACOVE NH QI set could be measured with administrative data. No QIs could measure care concerning medical history, nursing procedures, and surgery, while assistive devices, counseling, and complex procedures each had only a single QI captured. Approximately one-quarter of triggered QIs were excluded from consideration because of advanced dementia, poor prognosis, or DNH decisions. After these global exclusions, overall quality of care was higher. Despite increasing availability of administrative data and the opportunity to merge claims to the MDS, evaluation using a comprehensive set of processes of care for NH residents still requires evaluation of medical records, which is expensive.

This study shows that MDS data permit the measurement for residents in the nursing home of a small number of geriatric QIs adapted for use with administrative data. Prior work showed that geriatric conditions in community-dwelling older adults such as end-of-life care, falls, pressure ulcers, hearing, and urinary incontinence could not be captured with claims-based data alone.[9,10] In the current study, addition of information from the MDS 2.0 allowed for the measurement of 8 QIs, which could not be captured with claims-based data alone. Additional information from the MDS also allowed us to identify severe conditions (advanced dementia, poor prognosis) or preferences (do not hospitalize) that warrant exclusion of patients from application of a subset of quality measures.[15] We were able to measure an additional 24 QIs only because we had access to Medicaid files that contained pharmacy data. The paucity of process of care assessments within routinely collected MDS data limits the direct measurement of the specific care delivered to SNF residents. The ACOVE QIs consider MDS data as evidence of adherence for only 7 of the administrative items. To comprehensively measure care delivered to NH residents, better assessment of relevant processes of care should be added to the MDS and better methods of obtaining information are needed. These could include systematic resident interview, care observations, and chart review. The latter would be greatly facilitated by implementation of electronic health records. The electronic health record has the potential for greatly expanding the evaluation of geriatric-specific care and would be a quantum leap in quality measurement for NH residents.

Even recognizing the limitations of the set of implemented NH measures, the limited set of QIs that can be measured using administrative data demonstrate that selected aspects of care for older adults in long term care need improvement. For instance, among residents with new difficulty with balance, only about a third received physical therapy or a new assistive device. Those with a new diagnosis of heart failure were unlikely to receive the recommended elements of a diagnostic evaluation and patients with a new depression diagnosis uncommonly received timely pharmacotherapy. Other areas of care identified as needing improvement based on administrative data include treatment of atrial fibrillation and a new diagnosis of osteoporosis. Although the measures presented here do not represent a comprehensive evaluation of care, they can be produced for large numbers of patients and therefore can be used to target needed improvements and to serially measure care to monitor intervention effects.

NH quality likely varies across multiple dimensions. Prior research has shown that there is variation in measures of quality (as measured by deficiencies) across nursing homes.[16] The methodology described in the current study could be used to study quality variation across nursing homes in a similar fashion. Measuring processes of care would have the advantage of primarily measuring care that should be received rather than care that should be avoided.

National efforts to measure the quality of care processes are gaining traction and have the potential for improving NH care. Current community-based efforts are focused primarily on improving the medical aspects of care. Although pay for performance is being considered in NH settings, the most significant recent change in Medicare SNF payment policy was primarily generated by a perceived need for cost control rather than improving quality of care.[17] Medicare currently has initiatives to measure the quality of care in hospitals and in nursing homes.[2,18,19] Although the current study focuses on long term care residents, the findings are applicable to quality improvement efforts, suggesting that measurement based primarily on administrative data without other sources of information such as the MDS would fall far short of capturing the care that is most important. Implementing process of care measurement in NHs will permit the linking of reimbursement with quality for future interventions.

Using a crude exclusion rule based on burdens and expected benefits of care, 28% of triggered QIs were excluded from application to NH residents because of advanced dementia, poor prognosis or a DNH order. Excluded care processes would not be inappropriate for these patients, but according to 2 rounds of expert panel review, not providing such care would not necessarily be bad care.[15] The fact that more than one-quarter of measures were excluded highlights the importance of fine-tuning QI eligibility for advanced disease. More sophisticated methods of linking appropriate care processes with a patient's prognosis and burden of illness are needed, including incorporation of the perspectives of patients and, where appropriate, caregivers. The valuable impact of prognosis and burden-based global exclusions should be noted: application of these exclusions to a community-based sample of vulnerable elders only excluded 0.6% of QIs and had no effect on the overall quality of care score.[13] In this sample of NH residents, exclusions yielded an absolute increase of 9% in measured quality. Among patients with any

reason for global exclusion 61% of QIs were excluded with a resulting increase in quality score from 65% to 84%.

Limitations

This is a retrospective study using administrative data. Several MDS 2.0 items have questionable reliability and validity.[20–25] Eligibility for QIs and processes of care delivered may be under- or over-reported by the administrative data. For instance, it appears that ophthalmologists are not billing separately for postcataract follow-up visits. We attempted to explicitly describe some of these limitations in Appendix 1, Supplemental Digital Content 1, http://links.lww.com/A892. Results may not generalize to other regions or to patients who are not enrolled in both Medicaid and Medicare. The accuracy of the underlying administrative claims data has not been tested for NH residents. Independent evaluations of MDS 2.0 data have shown mixed reliability and accuracy results. Future studies could compare results of QI scores obtained from different data sources, considering resources required to obtain, agreement among data sources and the effect of data source on quality conclusions. The ACOVE QIs used here were designed to reflect care practices during the study period. Thus, the care profiled here represents the standard of care in 2000. Despite these limitations, the current approach represents a starting point in the measurement of processes of care among NH residents.

CONCLUSIONS

Quality of care evaluation using a limited number of administrative data-derived process of care measures is feasible for NH residents. QIs that can be implemented tend to reflect general medical rather than geriatric and NH-specific care, reflecting the need to increase the availability of routinely collected information about care provided. Those QIs that can be measured target areas in need of improvement.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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TABLE 1

Implementation of QIs by Condition and Intervention

	Total QIs	Implemented QIs	Percent of QIs Implemented
Condition group			
Acute care services	9	0	0
Continuity of care	9	0	0
Dementia	16	2	13
Depression	20	6	30
Diabetes mellitus	10	3	30
End of life	14	2	14
Falls and mobility problems	9	1	11
Hearing loss	4	0	0
Heart failure	13	6	46
Hospital care	7	1	14
Hypertension	12	4	33
Ischemic heart disease	12	3	25
Malnutrition	17	2	12
Medication use	13	7	54
Osteoarthritis	9	1	11
Osteoporosis	7	2	29
Pain management	8	0	0
Pneumonia and influenza	12	0	0
Pressure ulcers	12	0	0
Quality of residential care	19	0	0
Screening and prevention	11	0	0
Stroke and atrial fibrillation	12	3	25
Urinary incontinence	13	2	15
Vision impairment	15	5	33
Intervention			
Assistive device	16	1	6
Counseling	9	1	11
Dietary advice	10	2	20
Physical exam	34	2	6
Follow-up	11	3	27
History	37	0	0
Information continuity	26	2	8
Laboratory test	14	11	79
Medication	69	20	29
Nursing	11	0	0
Complex procedure	7	1	14
Referral	11	2	18
Surgery	6	0	0

	Total QIs	Implemented QIs	Percent of QIs Implemented
Simple test	12	3	25
Exercise, PT	10	2	20
Total	283	50	18

Total QIs indicates number of QIs defined within each condition or intervention group; Implemented QIs, number of QIs defined within each condition or intervention group that were implemented using administrative data; Percent of QIs implemented, percent of QIs defined within each condition or intervention group that were implemented using administrative data.

TABLE 2

Demographic Characteristics of Dual Medicare-Medicaid Enrollees Living in Nursing Homes in 19 California Counties, 1999–2000

	%
Age (%)	
65 to 69 yrs	5
70 to 74 yrs	10
75 to 79 yrs	16
80 to 84 yrs	20
85 to 89 yrs	22
90+ yrs	26
Age (mean; yrs)	84
Female (%)	75
Race (%)	
White	76
Black	9
Latino	8
Asian	5
Other	1
Prevalent disease 1996 to 2000 (%)	
Urinary incontinence	90
Dementia	80
Any heart disease	74
Hypertension	71
Cataracts	55
Cerebrovascular disease	52
Osteoarthritis	51
Any depression	47
Heart failure	47
Blindness/severe vision impairment (both eyes)	37
Osteoporosis	28
Atrial fibrillation	24
Renal disease	20
Acute myocardial infarction	7
County of residence (%)	
Alameda	11
Contra Costa	5
Fresno	7
Lassen	0.3
Marin	2
Monterey	2
Nevada	1

	%
Riverside	8
Sacramento	7
San Bernardino	9
San Diego	15
San Francisco	8
San Luis Obispo	2
San Mateo	4
Santa Clara	10
Santa Cruz	0.1
Sonoma	3
Tulare	4
Yolo	1
Death (%)	
1 yr	29
2 yrs	53
Exclusion from selected measures (%)	
Advanced dementia	63
Poor prognosis	5
Do not hospitalize order	14

N = 21,657.

TABLE 3

Administrative Data-Based Quality Indicator Performance–Dual Eligible Enrollees 65 Years and Older Living in Nursing Homes

Summary of Quality Indicator[*]	Data Source	Total Eligible	Passed	Passed (%)
NH resident with newly diagnosed dementia should have B_{12} and TSH checked.	C	923	22	2%
NH resident with dementia and new depression should be treated for depression.	C	1279	262	20%
NH resident with new depression should be treated within 2 wks of diagnosis.	C	1151	138	12%
NH resident newly treated for depression should not receive tertiary amine TCAs, MAOIs, benzodiazepines, or stimulants as first line therapy.	C	103	100	97%
NH resident with CAD started on TCA should have a baseline ECG performed.	C	10	3	30%
NH resident taking an SSRI should have an appropriate washout period before starting an MAOI, and vice versa.	C	2	2	100%
NH resident with newly diagnosed depression should have TSH checked.	C	1116	127	11%
NH resident with new depression that improves with treatment should continue that antidepressant for at least 6 mos.	C	16	11	69%
NH resident with diabetes should have a glyHgb measured at least annually.	C	1615	524	32%
NH resident with diabetes and proteinuria should receive an ACEI or ARB.	C	906	888	98%
NH resident with diabetes and is not blind should have an annual dilated eye exam.	C	972	377	39%
All NH residents should have an advance directive.	M	21,657	18,281	84%
NH resident should have aggressiveness of care treatment preferences followed.	B	14,709	14,156	96%
NH resident with new balance difficulty should receive PT or an assistive device.	B	1219	416	34%
NH resident with HF and LVEF <40% should receive an ACEI or ARB.	C	3408	1123	33%
NH resident with new HF should have a CXR, ECG, and appropriate laboratory studies.	C	1931	696	36%
NH resident with new HF should have LVEF evaluated.	C	581	14	2%
NH resident with HF and no contraindications should receive a beta-blocker medication.	C	1716	229	13%
NH resident post-hospitalization for HF should have follow-up visit and weight measured within 14 d after discharge.	C	1812	551	30%
NH resident with HF treated with digoxin should have a digoxin level checked if a medication that can alter levels is added.	C	38	10	26%
NH resident hospitalized for nonemergent revascularization or aneurism repair should have had cardiac stress test within 12 mos of operation.	C	33	4	12%
NH resident with new HTN should have an ECG appropriate laboratory studies.	C	802	227	28%
NH resident newly prescribed a diuretic should have electrolytes checked in 10 d.	C	591	65	11%
NH resident with hypertension and renal disease should receive an ACEI or ARB.	C	1249	390	31%
NH resident with hypertension and asthma should not be treated with a beta blocker.	C	1725	1487	86%
NH resident has had an AMI should receive a beta blocker medication.	C	1336	287	21%
NH resident with CAD and hypercholesterolemia should receive a cholesterol-lowering agent.	C	959	270	28%
NH resident hospitalized for AMI should have assessment of LVEF.	C	100	63	63%
NH resident with a newly placed feeding tube should first have received a nutrition consult, feeding aid, or supplements.	B	1385	1147	83%
NH resident with nutritional deficiency posthospitalization for hip fracture should receive protein-energy supplementation.	B	76	41	54%

Summary of Quality Indicator[*]	Data Source	Total Eligible	Passed	Passed (%)
NH resident receiving warfarin should have an INR checked within 4 d of start and every 6 wks thereafter.	C	1094	917	84%
NH resident receiving a diuretic should have potassium measured annually.	C	8969	7807	87%
NH resident receiving an oral hypoglycemic should not be prescribed chlorpropamide.	C	3641	3628	100%
All NH residents should not receive medications with strong anticholinergic effects.	C	21,657	17,710	82%
NH resident who does not need control of seizures should not receive a barbiturate.	C	16,455	16,237	99%
NH resident needing analgesia should not receive meperidine.	C	21,657	21,433	99%
NH resident newly prescribed an ACEI, ARB, or diuretic should have potassium and creatinine checked within 30 d and annually thereafter.	C	2700	857	32%
NH resident older than 75, is treated with warfarin or has a history of PUD or GI bleed, AND is treated with NSAIDs should be offered misoprostol or a PPI.	C	1947	517	27%
NH resident is bedfast should receive mobilization.	M	1085	328	30%
Female NH resident with new osteoporosis should be offered pharmacologic treatment.	C	443	88	20%
NH resident without a history of stroke has a presumed stroke with hemispheric symptoms should have a head CT or brain MRI.	C	77	45	58%
NH resident with high risk AF should be offered anticoagulation or antiplatelet therapy.	C	1841	391	21%
NH resident <70 yrs old has a thrombotic CVA or TIA and hypercholesterolemia should be offered treatment to lower cholesterol.	C	36	11	31%
NH resident with UI and able to self toilet should have a behavioral intervention.	M	178	88	49%
NH resident with UI should be on a toileting assistance program.	M	2605	2541	98%
All NH residents should be offered an eye evaluation annually.	C	3387	1676	49%
NH resident with new primary open angle glaucoma should have a comprehensive eye exam.	C	2	1	50%
NH resident with proliferative diabetic retinopathy should have eye exam every 4 mo.	C	87	19	22%
NH resident post-cataract surgery should have a follow-up eye exam within 3 mos.	C	313	44	14%
NH resident with primary open angle glaucoma should have appropriate yearly eye exam.	C	782	212	27%

[*] For full text of each quality indicator see Appendix Table 1, Supplemental Digital Content 1, http://links.lww.com/A892.

ACEI indicates angiotensin converting enzyme inhibitor medication; AF, atrial fibrillation; AMI, acute myocardial infarction; ARB, angiotensin receptor blocker medication; B, both claims and Minimum Data Set; B12, vitamin B12 level; C, claims only; CAD, coronary artery disease; CT, computed tomography; CVA, cerebrovascular accident (stroke); CXR, chest x-ray; ECG, electrocardiogram; GI, gastrointestinal; glyHgb, glycosylated hemoglobin level; HF, heart failure; HTN, hypertension; INR, international normalized ratio; LVEF, left ventricular ejection fraction; M, minimum data set (MDS) only; MAOI, monamine oxidase inhibitor; MRI, magnetic resonance imaging; NSAID, non-steroidal anti-inflammatory drug; PPI, proton pump inhibitor medication; PT, physical therapy; PUD, peptic ulcer disease; SSRI, selective serotonin reuptake inhibitor medication; TCA, tricyclic antidepressant medication; TIA, transient ischemic attack; TSH, thyroid stimulating hormone level; UI, urinary incontinence.

TABLE 4

Summary QI Performance by Condition, With Impact of Exclusions[*]

Condition Group	QI Implementation		Results with Exclusions[*]			Results Without Exclusions			
	Total	Potentially Excluded[*]	Total Eligible	Passed	Passed (%)	Total Eligible	Passed	Passed (%)	% Triggered QIs Excluded
Dementia	2	1	2202	284	12.9	3633	311	8.6	39.4
Depression	6	0	2398	381	15.9	2398	381	15.9	0
Diabetes mellitus	3	3	3493	1789	51.2	9286	4578	49.3	62.4
End of life	2	0	36,366	32,437	89.2	36,366	32,437	89.2	0
Falls and mobility problems	1	1	1219	416	34.1	4410	1384	31.4	72.4
Heart failure	6	3	9486	2623	27.7	20,145	4661	23.1	52.9
Hospital care	1	0	33	4	12.1	33	4	12.1	0
Hypertension	4	2	4367	2169	49.7	8553	3248	38	48.9
Ischemic heart disease	3	3	2395	620	25.9	4606	1015	22	48
Malnutrition	2	1	1461	1188	81.3	1720	1317	76.6	15.1
Medication use	7	1	76,173	68,589	90	78,249	70,627	90.3	2.7
Osteoarthritis	1	0	1947	517	26.6	1947	517	26.6	0
Osteoporosis	2	2	1528	416	27.2	5089	1369	26.9	70
Stroke and atrial fibrillation	3	3	1954	447	22.9	5400	1056	19.6	63.8
Urinary incontinence	2	2	2783	2629	94.5	13,166	12,750	96.8	78.9
Vision impairment	5	4	4571	1952	42.7	12,218	4538	37.1	62.6
Total	50	26	152,376	116,461	76.4	207,219	140,193	67.7	26.5

[*] QIs excluded from application to patients with advanced dementia, poor prognosis, or "do not hospitalize" orders.

TABLE 5

Summary Quality Indicator Performance by Intervention Type, with Impact of Exclusions[*]

Intervention Type	With Exclusions[*]			Without Exclusions[*]			% Triggered QIs Excluded
	Eligible	Passed	Passed (%)	Eligible	Passed	Passed (%)	
Assistive device	2605	2541	97.5	12,762	12,554	98.4	79.6
Exercise, physical therapy	2304	744	32.3	8618	2531	29.4	73.3
Simple test	220	115	52.3	599	341	56.9	63.3
Referral	4359	2053	47.1	11,841	4844	40.9	63.2
Follow-up	1182	275	23.3	2891	608	21.0	59.1
Counseling	178	88	49.4	404	196	48.5	55.9
Laboratory test	20,360	11,266	55.3	27,551	12,571	45.6	26.1
Medication	81,527	65,202	80.0	102,651	72,242	70.4	20.6
Dietary advice	1461	1188	81.3	1720	1317	76.6	15.1
Physical exam	1814	552	30.4	1816	552	30.4	0.1
Information continuity	36,366	32,437	89.2	36,366	32,437	89.2	0.0
Total	152,376	116,461	76.4	207,219	140,193	67.7	26.5

[*] QIs excluded from application to patients with advanced dementia, poor prognosis, or "do not hospitalize" orders.