Helping Nursing Homes "At Risk" for Quality Problems: A Statewide Evaluation

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The Quality Improvement Program for Missouri (QIPMO), a state school of nursing project to improve quality of care and resident outcomes in nursing homes, has a special focus to help nursing homes identified as "at risk" for quality concerns. In fiscal year 2006, 92 of 492 Medicaid-certified facilities were identified as "at risk" using quality indicators (QIs) derived from Minimum Data Set (MDS) data. Sixty of the 92 facilities accepted offered on-site clinical consultations by gerontological expert nurses with graduate nursing education. Content of consultations include quality improvement, MDS, care planning, evidence-based practice, and effective teamwork. The 60 "at-risk" facilities improved scores 4%–41% for 5 QIs: pressure ulcers (overall and high risk), weight loss, bedfast residents, and falls; other facilities in the state did not. Estimated cost savings (based on prior cost research) for 444 residents who avoided developing these clinical problems in participating "at-risk" facilities was more than $1.5 million for fiscal year 2006. These are similar to estimated savings of $1.6 million for fiscal year 2005 when 439 residents in "at-risk" facilities avoided clinical problems. Estimated savings exceed the total program cost by more than $1 million annually. QI improvements demonstrate the clinical effectiveness of on-site clinical consultation by gerontological expert nurses with graduate nursing education. (*Geriatr Nurs* 2009;30:238-249)

Nearly everyone has some life experiences or opinions based on media about nursing homes and the need for quality improvement. States and federal agencies spend enormous amounts of time regulating and surveying nursing homes, but quality problems persist.[1,2] In the past decade, federal initiatives have emphasized quality improvement,[3] and researchers have tested a variety of ways to engage nursing home staff to embrace methods of quality improvement and best clinical practices.[4-8] However, finding ways that are clinically effective, but not cost-prohibitive, to assist nursing homes most at risk for quality concerns eludes most states.

This is a program report of the findings of 2 consecutive annual evaluations of the Quality Improvement Program of Missouri (QIPMO). This program is sponsored by the Department of Health and Senior Services (DHSS) in an effort to help facilities in the state develop quality-improvement programs and improve the quality of care to Missouri nursing home residents.

Program Overview

DHSS staff envisioned QIPMO to be separate from the regulatory process and partnered in the 1990s with the University of Missouri, Sinclair School of Nursing (SSON) to design a clinical consultation program based on quality improvement principles and driven by data from the Minimum Data Set (MDS) and its derived quality

indicators (QIs). Initial goals of the program were to help nursing facilities develop quality improvement programs, improve quality of care, and improve reliability of MDS data.

The MDS is a federal assessment instrument completed for each nursing home resident upon admission, quarterly, and upon significant changes in condition. Data from the instrument are collected by each state and nationally. From the assessment data, potential indicators of quality problems (QIs) or quality measures (QMs) are derived. The methods of calculation of QIs and QMs have been studied and evaluated since the MDS was implemented in nursing homes nationwide in 1990.[9-12] A national evaluation concluded that there was strong evidence that many of the QIs "do capture meaningful aspects of nursing facility performance."[11] There have also been two General Accounting Office reports raising questions about accuracy of reported MDS data, subsequent QI accuracy, and state procedures to ensure accuracy.[13,14] Regardless of controversy, a version of these indicators has been posted on the federal Nursing Home Compare Web site since 2002 to inform consumers about quality of care of nursing homes to help them make informed decisions (*www.medicare.gov/NHCompare/Home*).

Underlying principles and consultation methods used in QIPMO are research-based. They were tested in a randomized clinical trial of a quality improvement intervention in nursing homes.[5] Findings of this trial revealed that resident outcomes can be improved with the help of a gerontological expert nurse with graduate nursing education, on-site clinical consultation, quality improvement tools to improve care delivery processes, and measurable MDS QI feedback reports showing individual facilities how they are doing as compared with others in the state. Other studies have found the same positive impacts on nursing home resident outcomes by advanced practice nurses.[15,16]

The program officially began in 1999 (after the earlier-noted clinical trial), is funded annually by a "provider bed tax," and evaluated each year for its continued clinical impact on resident outcomes using MDS QIs.[7] Currently, there are 4 expert gerontological nurses (most with graduate nursing degrees) working in QIPMO; all are clinical track faculty of the SSON. The program is voluntary. Facilities request and schedule the services of QIPMO by calling the staff project coordinator at the SSON, who triages the request

and sends it via e-mail to the appropriate QIPMO nurse. The nurse contacts the facility by phone to discuss concerns and schedules a consultation site visit. Demand for the service has grown as facility staff receive assistance from the QIPMO nurse that they perceive as valuable. Word of mouth has been the program's best advertising, although when the program began, it was advertised throughout the state in nursing home association newsletters and DHSS communications to nursing homes. Throughout the years, almost all facilities in the state have participated in 1 or more of the services of QIPMO. Consistently, the facility staff's annual evaluations of the services of the expert nurses are very positive, and resident QI outcome evaluations have revealed improvements in facilities using the services.[7,17]

In 2005, a special focus was initiated to offer QIPMO services to facilities that might be most "at risk" for quality concerns. With declining state revenue and program funding, this special focus was an effort to prioritize scarce resources and offer services to those who might most benefit.

Results of the fiscal year 2006 evaluation of QIPMO are presented and discussed. The evaluation compared facilities in the state that used on-site consultation services with those who did not. Additionally, the evaluation included comparison of those facilities identified most "at risk" for quality concerns with others in the state. Results of this targeted approach offering QIPMO nurse consultation site visits and working with facilities are presented. Similarities with fiscal year 2005 evaluation results are also discussed.

Design and Methods

Expert Nurse Clinical Consultation

QIPMO services are multifaceted and include the tested methods[5,7] of on-site clinical consultation, other communication, and education with nursing facility staff focused on improving quality of care, care planning, and use of the MDS, using federal and state comparative QI and QM reports for each nursing home, disseminating and helping facilities use evidence-based practice, and helping facilities develop effective teams to improve care delivery. QIPMO nurses are experts in gerontological nursing; most have graduate degrees in gerontological nursing (one is PhD-prepared in nursing). All are clinical track faculty of the

SSON and often mentor clinical experiences for both graduate and RN to BSN nursing students who are interested in gerontology and particularly interested in the APN role of the QIPMO nurse helping nursing homes improve quality of care. All have experience working in nursing homes with older adults and were oriented carefully to the role of clinical consultation to long-term care facilities.[5,7] The nurses live in different geographic regions of the state to minimize driving time and expense while maximizing consultation time to facilities.

Site visits are typically 2–3 hours in length. Although often scheduled for a shorter time, facility staff usually want more time because topics tend to snowball. In most cases, the content of the visit is planned or discussed on the phone or at a prior site visit. The most frequently requested educational content is to explain and help interpret federal or state quality indicator/quality measure (QI/QM) reports and explain how to use them. The QIPMO nurses use examples solicited from facility staff as case studies and provide suggestions about nursing interventions, care planning, and documentation.

The following is an example of a site visit. A director of nursing (DON) of a 120-bed facility in central Missouri calls the QIPMO project coordinator asking for help. She has heard from her nursing home association that there is growing concern about pressure ulcers and facilities can anticipate close scrutiny in upcoming state surveys. The project coordinator triages the request to the central Missouri QIPMO nurse who calls the DON to get more details about the facility's current prevention and treatment practices for pressure ulcers and to schedule a time to meet with staff. They agree on a time and date; the QIPMO nurse suggests the DON have a small team of staff (perhaps another RN or an LPN, the MDS coordinator, and a nursing assistant) available for a brief meeting to discuss current practices and begin examining how they are doing in this area. When the QIPMO nurse arrives, she asks the MDS coordinator to print the facility's latest QI/QM report from the MDS transmission homepage. This report displays both their low-risk and high-risk pressure ulcer rates, how they compare with others in their state, and a roster of the residents in their facility listed on the report as having a pressure ulcer. Team members examine the report with the QIPMO nurse, check the roster for accuracy, and can use this report as a baseline for measuring the effect of changes they may make in their care routines. The QIPMO nurse then leads the team in a discussion of the prevention and treatment currently in place in their facility. Staff members admit they are not doing skin risk assessments consistently, and they find their current risk tool cumbersome. The QIPMO nurse offers suggestions for evidence-based assessment tools and practice guidelines for prevention. Staff agree to work on revising their facility policies and ask the QIPMO nurse to come back to do training for their nursing staff about pressure ulcer prevention and meet with their team again next month.

Special training for the MDS coordinator and care plan team is often requested by facilities because MDS data are used for reimbursement, QM reports for consumers, and by federal and state regulators. The QIPMO nurse helps the care plan team understand the complete Resident Assessment Instrument (RAI) process and apply it into practice. Common topics for education requested by facility staff include infection control, wound care, tube feeding, dementia and behavioral issues, documentation, medication management, nutrition, and safety for the elderly. In all education, effective teamwork and communication is emphasized.

E-mail, phone, and fax connect QIPMO nurses to most facilities in the state. Facilities directly contact the QIPMO nurse in their region for information about clinical practice and specifics about the MDS/RAI process. Over the years, nursing home staff members have come to rely on their QIPMO nurse for accurate evidence-based guidance. Routine e-mails from QIPMO to nearly all facilities in the state keeps people up-to-date on the latest issues and changes on the horizon. The team maintains a Web site of free downloadable training materials and helpful links at *www.nursinghomehelp.org*.

Support groups for MDS coordinators are facilitated by QIPMO nurses throughout the state monthly or quarterly, depending on interest. Support groups encourage networking among MDS coordinators. Facilities volunteer to host the 2-hour meeting. A QIPMO nurse presents specific details about care planning and assessment using the MDS and answers many questions about coding, transmission, and reports available from federal and state sources. All facilities in each region are invited to the support group meetings and many participate.

Identifying Facilities at Risk

To locate facilities "who might most benefit" from the QIPMO services, state agency staff discussed options with our interdisciplinary research team.[16] Our team is responsible for the required program evaluations and has extensive history of MDS data analysis,[5,6,7,17] the required federal Data Use Agreement (DUA) to work with MDS data, and Internal Review Board approval. We decided to use facility QI scores calculated from MDS data. On the basis of prior research findings,[9,18] 12 QIs found to be most sensitive to quality-of-care practices of nursing home staff were used in this analysis: falls, depression, depression without treatment, use of 9 or more medications, bladder or bowel incontinence, urinary tract infection, weight loss, dehydration, bedfast residents, decline in late-loss activities of daily living (ADLs), daily physical restraints, and stage 1–4 pressure ulcers.

The 12 QIs were applied in selection criteria using MDS data from quarters 1 and 2 of 2006, the quarters before the beginning of the DHSS annual cooperative agreement (July 1 through June 30). Facilities were required to be at or above the 80th percentile on the restraint *or* pressure ulcer QI *and* also on 1 or more of the other care-sensitive QIs. Selecting above the 80th percentile locates likely quality-of-care problems because QIs are problem-based scores, so higher scores indicate greater likelihood of problems. Requiring either high use of restraints or high numbers of pressure ulcers allowed us to target facilities with conditions that were of importance to state agency staff. Using this approach, 88 facilities in the state were identified "at risk" for quality of care problems. Four other facilities identified by the Centers for Medicare and Medicaid Services as "special focus facilities" based on survey history were added to the list, for a total of 92 facilities. Although attempts to offer services were made by QIPMO nurses to all 92 facilities, not all accepted on-site clinical consultation.

Evaluation Design

Because QIPMO is a full-coverage program available to all facilities in the state, a statewide analysis of all facilities is performed annually using the principles of public program evaluation.[19] To discern the isolated impact of providing on-site clinical consultation to facilities that use this service, particularly those identified "at risk" for quality concerns, a group comparison was used:

1. At-risk facilities accepting 1 or more site visits in the contract period ($n = 60$)
2. At-risk facilities that refused the offer of site visits during the contract period ($n = 32$)
3. Non-at-risk facilities accepting 1 or more site visits ($n = 129$)
4. Non-at-risk facilities with no site visits ($n = 271$)

Demographic information about the 4 groups is summarized in Table 1.

As can be seen in Table 1, the groups are similar in bed size, ownership (government operated, not-for-profit, and for-profit), and rural versus urban or metro locations. Resident characteristics in the facilities are similar as measured by case mix index[20] and cognitive performance scale.[21] These results indicate no group differences among facility characteristics and resident population. Although group numbers varied, demographics were stable when compared with the 2005 evaluation.

Measurement of Improvement

Four quarters of MDS data were analyzed to evaluate the results of QIPMO services. The quarters coincided with the quarters of the DHSS cooperative agreement for services that began July 1, 2006, through June 30, 2007. Descriptive graphs and tables of each QI were used to compare progress of each group with baseline (Quarter 3, 2006), as were comparisons of actual and relative changes in QI scores and the number of residents affected by the changes in scores for each QI.

Using the numbers of residents who avoided each of the clinical problems represented by the QIs, cost-estimate analyses were performed for the "at-risk" facilities accepting 1 or more site visits. Costs for the treatment of the clinical problems represented by the QIs were estimated on the basis of primary research studies that measured the actual costs of treatment of those conditions in long-term care settings.

The analysis for this program evaluation is descriptive and involves only the calculation of summary statistics. Significance testing is not used because the groups are nonrandom and because the data set consists of essentially all facilities in the state of Missouri at that time. Thus, we

Table 1.
Group Demographics Fiscal Year 2006

Group	No. of Facilities	Average Licensed Beds	Ownership Gov	Ownership NP	Ownership FP	Urban	Metro	Rural	Average Case Mix	Average CPS	No. of Residents*
At risk, 1+ site visits	60	108	6%	17%	77%	40%	38%	22%	0.8	2.8	3640
At risk, refused site visit	32	119	15%	13%	72%	25%	66%	9%	0.8	2.8	2453
Not at risk, 1+ site visits	129	109	7%	27%	66%	40%	46%	14%	0.8	2.6	8237
Not at risk, no site visits	271	106	6%	22%	72%	37%	52%	11%	0.8	2.6	16,425
Total	492	110	7%	22%	71%	38%	49%	13%	0.8	2.7	30,755

CPS = cognitive performance scale; FP = for profit; Gov = government; NP = nonprofit.
*Number of residents at baseline in the quality indicators calculations.

have a census rather than a "sample," making significance testing inappropriate.[22] Trends in QI scores were required to have clinically significant improvements that were comparatively different from other groups. The clinicians in the research team determined "clinically significant" trends based on the size of relative improvement in scores in 1 group versus others and numbers of residents included in calculations of each QI. Using this approach, small fluctuations in QI scores are ignored because it is unlikely they are relevant.[9]

To measure the dose of QIPMO services, the utilization of services across groups is counted. Table 2 summarizes numbers of clinical consultation site visits and other nonsite contacts (e-mail, phone consultation, support group meetings, conference calls, etc.) made by QIPMO nurses. Because this is a voluntary state program, services are offered, but facilities choose to accept consultation site visits or other nonsite contacts. The program is advertised in state communications, association news letters, press releases, and by word of mouth. The numbers of site visits and other contacts with facilities are similar to the prior year; this is not surprising, because the QIPMO staff and percent of effort in the program are the same both years.

Results

Twelve MDS QIs, those most sensitive to quality-of-care practices[9,18] as reported earlier, were used in this analysis. Because pressure ulcers, ADLs, and incontinence are risk adjusted, 18 QIs are calculated and analyzed to describe more fully the clinical impact of QIPMO services.

Improvement Trends in QIs

Improvement trends (4%–41% relative improvement) were measured in 5 QIs in the "at-risk" group that accepted 1 or more site visits but not in other groups (see Table 3), indicating the QIPMO services had a positive impact on this group. Five other QIs revealed improvements in the "at-risk" group that accepted site visits and some improvements in other groups as well (mixed results). Restraints improved 21% in the at-risk group with site visits and 24% in the not-at-risk group without site visits; this is an unexplained finding for the not-at-risk group without site visits. There has been statewide educational

Table 2.

Summary of Expert Nurse Site Visits and Other Contacts Fiscal Year 2006

Groups	No. of Facilities	Facilities with 1 Site Visit	Facilities with 2–4 Site Visits	Facilities with 5–10+ Site Visits	Total Facilities with Site Visits	Total Site Visits
At risk, 1+ site visits	60	23	22	15	60	196
Not at risk, 1+ site visits	129	73	59	28	160	462
Total site visits	189				220	658
		1 Nonsite Contact	2–4 Nonsite Contacts	5–10 Nonsite Contacts	Total Facilities with Nonsite Contacts	Total Nonsite Contacts
At risk, 1+ site visits	60	9	21	13	43	157
Not at risk, 1+ site visits	129	21	49	53	123	999
At risk, refused site visit	32	11	24	10	45	138
Not at risk, no site visits	271	44	46	20	110	375
Total nonsite contacts	492				321	1669

and regulatory focus on minimizing restraints, but if that were related, one would expect reduction across all groups.

Four of the QIs did not improve (see Table 3). Remaining QIs (pressure ulcers for low-risk residents, incontinence for high-risk residents, and dehydration) were zero for all groups. Negative signs in Table 3 indicate that QI results actually worsened by that percentage for that group of facilities. Recall that significance testing is inappropriate because the complete population of nursing homes in the state is used.[22]

In the fiscal year 2005 evaluation, similar results were revealed. Pressure ulcers improved 21% and 26% for those at high risk. Weight loss improved 15%. Other QIs that improved in the 2005 evaluation but were not detected in 2006 were decline in late-loss ADLs (overall improved 16%; for low-risk residents 22%; for high-risk residents 14%) and depression with no treatment (improved 15%). These clinical improvements were noted in the "at-risk" group accepting one or more site visits but not in other groups, indicating the QIPMO services had a positive impact on this group.

Residents Impacted and Estimated Cost Savings

A total of 444 residents in the at-risk group did not develop the clinical problems represented by the QIs (see Table 4). Cost estimates of savings from avoiding these problems were calculated

on the basis of research studies examining each clinical problem. For example, researchers estimated that the average 2001 per event cost of healing pressure ulcers in a nursing home was $1727[23]; adjusted 2006 cost is $2119 (see Table 4). This cost does not include hospitalization or outpatient treatment costs for the resident with pressure ulcer(s). Cost estimates that include hospitalization or outpatient treatment to heal a complex, full-thickness pressure ulcer can be as much as $70,000; the cost for a less serious pressure ulcer ranges from $2000 to $30,000,[24] and pressure ulcers are a significant complication of the aging population.[25]

To calculate treatment cost of weight loss, several primary studies were used. Per event cost (excluding nursing labor) of treating weight loss in a nursing home resident was estimated to be $430 in 1997–1998 costs[26]; adjusted 2006 costs are $597. The hours of nursing labor to treat weight loss has been measured to be staffing at a level of 3 or more hours per day of nursing assistant time.[27] Average Missouri nursing assistant staff time in a random sample of nursing homes of varying quality was 2.2 hours at an average hourly wage of $7.75 in 2000 cost data.[28] Labor costs using these study results are estimated to be an additional $6.20 per resident per day (0.8 hour × $7.75). Weight-gain response to treatment has been measured to be 6 months with continued care needed for maintenance.[29] Six months of additional nursing assistant labor ($6.20 × 6 months) is $1131 using 2000 cost data; adjusted

Table 3.
Percentage Improvements in Quality Indicators (QIs) for "At-Risk" Groups with 1 or More Site Visits Compared with Other Groups, Fiscal Year 2006

QI	At Risk, 1+ Site Visits (*n* = 60)	Not at Risk, 1+ Site Visits (*n* = 129)	At Risk, Refused Site Visit (*n* = 32)	Not at Risk, No Site Visits (*n* = 271)
Improved in "at-risk" group only				
Pressure ulcers—overall	22%	−12%	−3%	−22%
Pressure ulcers for high-risk resident	12%	−14%	−11%	−20%
Weight loss	4%	−29%	−4%	−16%
Bedfast residents	41%	−26%	−35%	−9%
Falls	4%	−10%	−19%	−1%
Improved in "at-risk" group and some other groups (mixed results)				
Incontinence—overall	3.5%	0	4.8%	−1.4%
Incontinence—low-risk residents	3.3%	3.5%	7.9%	−2.3%
Urinary tract infection	2.5%	−4.5%	8.9%	0.5%
Depression	5.4%	0	4.5%	3.1%
Physical restraints	20.7%	−0.8%	−5.7%	24.4%
Did not improve in "at-risk" group				
Decline in late-loss ADLs—overall	−10.4%	−8.2%	−20.2%	1.7%
Decline in late-loss ADLs—low-risk residents	−6.9%	−3.5%	−14.1%	1.0%
Decline in late-loss ADLs—high-risk residents	0	33.3%	13.8%	11.1%
Depression with no treatment	−1.1%	9.7%	12.2%	2.6%
Nine or more medications	−0.5%	−0.5%	−0.9%	−3.2%

ADLs = activities of daily living.
Remaining QIs (pressure ulcers for low-risk residents, incontinence for high-risk residents, and dehydration) were 0 for all groups and are not presented in the table.
Significance testing is not used because the groups are nonrandom and because the data set consists of essentially all facilities in the state of Missouri at the time. Thus, we have a census rather than a "sample," making significance testing inappropriate.

2006 costs are $1453. Total per episode 2006 cost of treating a resident with weight loss is estimated to be $2050 ($597 treatment + $1453 labor).

Governmental cost of care for older adults who experience a decline in ADLs in a 1993 community-based study was found to be in excess of $10,000 per person in 2 years[30]; adjusted 2006 cost is $16,584; 1-year cost estimate is $8292. If one considers additional staff time and supply costs for nursing home residents with declining ADLs, this estimate is likely conservative. Cost estimates for treatment of bedfast residents and those with restraints are estimated to be $4146 or 50% of the decline in ADL treatment cost. Cost estimates for restraints and bedfast residents are based on the cost associated with ADL decline because both restraints and time in bed are known to result in ADL decline.[31,32]

The Centers for Disease control estimate that 20%–30% of falls have moderate to severe injuries

with associated costs of $19,440.[33] Eighteen residents avoided falls in the at-risk facilities; conservatively, 4 of these falls were likely to result in injury, with a total estimated cost of $77,760.

Average costs of $3554 per nursing home resident per year for incontinence management using briefs, bed pads, and barrier creams were measured in an incontinence management study.[34] This study was a secondary data analysis of data collected in summer 1994 for a national analysis of costs of pressure ulcer prevention[35]; adjusted 2006 cost is $5618.

Per event cost of urinary tract infection in a nursing home was estimated to be $691 in 2001[23]; adjusted 2006 cost is $848. This cost does not include any hospitalization or outpatient treatment costs for residents with urinary tract infection(s).

Both average inpatient and outpatient costs were $1766 higher annually for individuals with

Table 4.

Improvements and Estimated Cost Savings in "At-Risk" Groups with 1 or More Site Visits, Fiscal Year 2006

QI	No. Residents Who Did Not Develop the QI Problem	Estimated per Resident Cost of Treatment	Cost Savings by Not Developing the Problem*
Pressure ulcers	69	$2119	$146,211
Pressure ulcers for high-risk residents	37	$2119	$78,403
Weight loss	15	$2050	$30,750
Bedfast residents	33	$4146[†]	$136,818
Falls	18[‡]	$19,440	$77,760
Incontinence	60	$5618	$337,080
Incontinence for low-risk residents	38	$5618	$213,484
Urinary tract infection	11	$848	$9328
Depression	87	$2792	$242,904
Physical restraints	67	$4146[†]	$277,782
Total residents impacted and costs savings	444		$1,550,520

QI = quality indicator.
*Costs do not include outpatient or hospitalization costs for managing residents with these conditions or complications of them (note that falls, restraints, and depression are proxies from community-based studies that are further explained in text). Costs are from primary studies and are adjusted to 2006 using the medical consumer price index.
†Based on 50% of cost estimate of activity of daily living decline in 2006 of $8292.
‡Twenty to thirty percent of falls have moderate to severe injuries with associated costs of $19,440.[33] Conservatively, 4 of these 18 falls were likely to involve injury, and therefore cost was multiplied by 4 to estimate costs savings.

self-reported depressive syndromes in a 1994 representative national sample[36]; adjusted 2006 cost is $2792. Given the impact of depression across the life span, it is likely these estimates are relevant and likely conservative estimates for nursing home residents.

Summary of Estimated Cost Savings for "At-Risk" Facilities Who Participated

Total estimated cost savings by avoiding the development of key clinical problems for many residents living in "at-risk" nursing homes that participated in site visits ($n = 60$) is more than $1.5 million for the annual 2006/2007 period. This estimated savings exceeds the total program cost by more than $1 million.

These estimated cost savings are similar to those for fiscal year 2005, $1.6 million, when 439 residents living in "at-risk" nursing homes that participated in site visits ($n = 45$) avoided clinical problems associated with the QIs. In 2005, there were improvements of 21% for pressure ulcers, 26% pressure ulcers for high-risk residents, 16% decline in late loss ADLs, 22% ADLs for low-risk residents, 14% ADLs in high-risk

residents, 10% incontinence, 14% incontinence for low-risk residents, 32% urinary tract infection, 15% weight loss, and 15% depression with no treatment. Again, the 2005 estimated savings exceeded the total program cost by more than $1 million.

Statewide Improvements and Estimated Cost Savings

Statewide improvements in QI scores for fiscal year 2006 were analyzed, and the numbers of residents who avoided the development of the clinical problems defined by the QIs were calculated. Using the same cost-estimate analysis methods as were used in the "at-risk" facilities analysis, associated estimated costs of the care for treating the clinical problem were calculated. Table 5 displays the statewide improvements in QIs, the numbers of residents affected, and the estimated cost savings.

Although all the improvements in Table 5 cannot be interpreted as solely attributable to the efforts of QIPMO staff, the effect of the QIPMO's promoting quality improvement efforts, doing statewide education about resident assessment

Table 5.

Residents Affected by Statewide Improvements in Quality Indicators (QIs) and Estimated Cost Savings by Not Developing the Clinical Problems Measured by QIs, Fiscal Year 2006

QI	No. Residents Who Did Not Develop the Problem	Estimated per Resident Cost of Treatment	Cost Savings by Not Developing the Problem
Depression	400	$2792	$1,116,800
Depression without treatment	154	$2792	$429,968
Incontinence for low-risk residents	24	$5618	$134,832
Decline in ADLs for high-risk residents	110	$8292	$912,120
Daily physical restraints	123	$4146*	$509,958
Totals	811		$3,103,678

ADLs, activities of daily living.
*Based on 50% of cost estimate of ADL decline in 2006 of $8292.

and clinical care, completing 658 site visits in 220 facilities, and making 1669 other contacts to 321 facilities in the state (as summarized in Table 2), would likely have contributed to these improvements to some degree.

In summary, based on fiscal year 2006 statewide QI improvements, there were 811 residents who avoided development of these expensive, debilitating problems in nursing homes, at an estimated savings to the nursing homes with improvements of more than $3.1 million in care costs. Efforts to help facilities with quality improvement appears not only to be helpful to nursing home residents who receive better care when they need it, but also to the industry to improve care and reduce costs associated with common care problems.

Discussion

In the statewide fiscal year 2006 nursing home evaluation, 5 indicators improved in the "at-risk" group that accepted 1 or more QIPMO site visits and not in other groups, indicating the QIPMO services had a positive impact on this group. These 5 QIs had improvement trends of 4% to 41% in important clinical problems of pressure ulcers, pressure ulcers for high-risk residents, weight loss, bedfast residents, and falls. Five other indicators also improved 2.5% to 20.7% and included important clinical problems of incontinence, incontinence for low-risk residents,

urinary tract infections, depression, and use of physical restraints. These are clinically significant improvements that affected the lives of many residents in these facilities. More than 400 residents in participating "at-risk" facilities avoided these debilitating clinical problems, and thus facilities and the health care system in general avoided the costs of treating those problems—estimated at more than $1.5 million for the annual 2006 QIPMO contract period. Similarly, in 2005 more than 400 residents in "at-risk" facilities did not develop the problems represented by the QIs at an estimated cost savings of $1.6 million. Estimated savings far exceeded QIPMO program costs.

The clinical effectiveness of the QIPMO program has been evaluated previously, with similar results.[7] For example, in a recent evaluation of the impact of bedside technology on nursing home quality of care, facilities with technology that worked with QIPMO nurses had larger improvements in quality as measured by QIs than those in other states who did not have access to the service or matched control facilities in Missouri that did not use QIPMO.[17]

Similar to general effectiveness of advanced practice nurses caring for elders in nursing homes[15,37-39] or community,[40] the clinical impact on improving quality of care by expert gerontological nurses consulting in "at-risk" nursing homes can be large, as demonstrated in these evaluation results from 2006 and 2005. The expert gerontological nurse role should be embraced by

state agencies, nursing home providers, and consumers as an ongoing strategy to continuously improve the quality of nursing home care. It must be pointed out that the expert nurses in the QIPMO roles have graduate education in nursing, and we believe this preparation positions them to be successful in the expert gerontological nurse consultation role in nursing homes. On the basis of repeated evaluations of QIPMO and other advance practice nursing evaluations in long-term care that were cited earlier, it appears that the complexity of the clinical problems in nursing homes, particularly those "at-risk" for quality problems, requires an expert who has graduate level nursing education.

Theoretical underpinnings of QIPMO are continuous quality improvement, learning to improve care delivery processes, and learning to use teams for quality improvement. In the contentious environment of government regulation, it is sometimes difficult to help facility staff grasp that taking time to figure out root causes of problems and plan care process improvements to fix root causes is worth their time. The consultation role of QIPMO nurses is effective in overcoming this resistance and with follow-up visits or contacts by e-mail or telephone; facility staff can gather momentum and truly address care issues.

To measure progress in improvement, facilities are taught how to measure care delivery processes so they can do follow-up measures to mark improvements. This is highly recommended by other researchers in long term care.[8,41] QIPMO nurses demonstrate how to use MDS QI feedback reports. Federal reports are available to each facility in the country that display QI scores in both tables and graphs. Facility staff members learn to interpret their scores, identify care processes to improve, make changes in the processes, and gauge improvements by observing future QI scores or other markers.

Dissemination of evidence-based practice information is a critical function of the QIPMO service. Many facilities are isolated or have limited resources for continuing education. Ongoing communication with facilities is essential to connect them with up-to-date information. Most of the facilities in the state now participate in e-mail communication with QIPMO nurses and receive regular links to best practice and the latest care-related information.

This evaluation has several limitations. Although every effort was made to contact and encourage all facilities identified as "at risk," only those who agreed to participate received services. This is a self-selected portion of the "at-risk" group. Likewise, for the remaining portion of facilities in the state, they self-selected and chose to use QIPMO services. There may be other explanations for group differences due to self-selection. Another limitation is that "at-risk" facilities had larger margins for improvement of QI scores. We attempted to control for this by using relative improvements as the standard for clinically significant improvement in QI scores. Another limitation is that facilities determined the "dose" of QIPMO services by the number of site visits or other contacts they were willing to receive or sought. Additionally, this evaluation was not a randomized clinical trial of the QIPMO service; future research in this area should consider a more rigorous design.

An insight from this evaluation is the paucity of cost studies in nursing homes. It was extremely challenging to locate well-conducted studies that carefully calculated the costs of care delivery and treatment of common problems of elderly nursing home residents. Updated and continued cost analyses are needed.

Although no assisted living facilities were included in this evaluation, we think QIPMO services would likely be clinically effective and cost-effective for assisted living settings. Challenges of consulting in assisted living include a lack of standardized assessment data such as MDS that can provide indicators of quality across facilities and a paucity of registered nurse or advance practice nurse involvement in assessment, care planning, and care.[42,43] However, clinical conditions that are experienced by nursing home residents are also prevalent in assisted living,[44] and it is very likely that staff could benefit from best practice information and discussions with expert gerontological nurses such as those in the QIPMO program.

On the basis of the success of this evaluation and others that have measured the effectiveness of QIPMO, we highly recommend that other states pursue partnerships with schools of nursing. Replicating the program is also highly recommended. It is a good statewide investment of provider "bed tax" or other state agency funds with measurable clinical improvements for nursing home residents, particularly those living in facilities most at risk for quality problems.

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