Collaborative Clinical Quality Improvement for Pressure Ulcers in Nursing Homes

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(See editorial comments by Dr. George Taler on pp 0000–0000)

The National Nursing Home Improvement Collaborative aimed to reduce pressure ulcer (PU) incidence and prevalence. Guided by subject matter and process experts, 29 quality improvement organizations and six multistate long-term care corporations recruited 52 nursing homes in 39 states to implement recommended practices using quality improvement methods. Facilities monitored monthly PU incidence and prevalence, healing, and adoption of key care processes.

In residents at 35 regularly reporting facilities, the total number of new nosocomial Stage III to IV PUs declined 69%. The facility median incidence of Stage III to IV lesions declined from 0.3 per 100 occupied beds per month to 0.0 (P < .001) and the incidence of Stage II to IV lesions declined from 3.2 to 2.3 per 100 occupied beds per month (P = .03). Prevalence of Stage III to IV lesions trended down (from 1.3 to 1.1 residents affected per 100 occupied beds (P = .12). The incidence and prevalence of Stage II lesions and the healing time of Stage II to IV lesions remained unchanged. Improvement teams reported that Stage II lesions usually healed quickly and that new PUs corresponded with hospital transfer, admission, scars, obesity, and immobility and with noncompliant, younger, or newly declining residents. The publicly reported quality measure, prevalence of Stage I to IV lesions, did not improve. Participants documented disseminating methods and tools to more than 5,359 contacts in other facilities.

Results suggest that facilities can reduce incidence of Stage III to IV lesions, that the incidence of Stage II lesions may not correlate with the incidence of Stage III to IV lesions, and that the publicly reported quality measure is insensitive to substantial improvement. The project demonstrated multiple opportunities in collaborative quality improvement, including improving the measurement of quality and identifying research priorities, as well as improving care. J Am Geriatr Soc 2007.

Key words: pressure ulcers; nursing homes; quality improvement; quality measures; public reporting; translation of research to practice

Elderly and disabled persons dread pressure ulcers (PUs); they cause pain, limit activity, increase risk of sepsis, degrade self-image, and increase the costs and challenges of caregiving. Clinical guidelines provide recommendations for preventing and treating PUs. Clinicians stage PUs according to the depth of tissue injury, ranging from Stage I (nonblanchable erythema or discoloration of intact skin) to IV (deep injury through skin and muscle to bone). Although Stage III and IV generate most of the suffering, publicly reported indicators of nursing home quality combine all stages, presuming that higher rates of superficial lesions correlate with higher risks of full-thickness ulcers. Prevalence of PUs in nursing home ranges from 8.5% to 29%, with the national prevalence of Stages I to IV (second quarter 2005 Minimum Data Set (MDS)) being 13% for high-risk residents and 3% for low-risk residents.

Several studies have shown that hospitals and nursing homes with high baseline rates of PUs can reduce incidence and prevalence of PUs over time with improved practices. Another study benchmarked healing times with implementation-of-care protocols, reporting a mean of 62 days for Stage III to IV lesions. Studies of adherence to specific prevention strategies (e.g., assessment of risk or frequent repositioning) have generally shown adherence to be no better than 50%, whether in nursing homes, hospitals, or home care.
In 2003, the Centers for Medicare and Medicaid Services (CMS) contracted with the quality improvement organization (QIO) for the state of Washington, Qualis Health, to lead a collaborative quality improvement project focused on PUs in nursing homes. This report summarizes insights from the project, which initially aimed to develop and test quality improvement methods to reduce the incidence and prevalence of PUs; test a national collaborative quality improvement framework in nursing homes; reduce the incidence and prevalence of PUs among participating nursing homes 50%; identify effective strategies, tools, and interventions; and encourage and estimate the diffusion of improvement methods and best practices in nursing homes.

METHODS

QIOs and corporate partners each recruited one or two nursing homes to participate in this National Nursing Home Improvement Collaborative (NNHIC). The nursing homes had to have a publicly reported PU quality measure for third quarter of 2003 and at least 75 certified beds (to ensure continued public reporting). QIOs, collaborative faculty, and the corporate partners provided technical and logistical support. Nursing homes paid their own costs of participation.

Each participating nursing home assembled a quality improvement team that attended three learning sessions and a summary conference. Some larger facilities focused upon specific units, but most targeted their entire facility. Most targeted long-stay residents, but some included short-stay residents as well. Each learning session included faculty-led training and peer-to-peer sharing focused on quality improvement methods, measurement, and PU prevention and treatment. An expert panel selected initial improvement strategies from existing research, clinical guidelines, and expert opinion. Learning sessions, monthly conference calls, e-mail discussions, and the final conference addressed problems and reported teams’ successes and challenges. Qualis Health developed an electronic registry that generated monthly reports of aggregate data for participating sites. To probe details of changes in processes and outcomes, faculty members interviewed teams during learning sessions and conducted two 2-hour telephone focus groups at the project’s end with eight representative teams.

The registry calculated the following facility-specific and aggregate measures each month.

A. Days between the onset of new facility-acquired Stage II to IV PUs
B. Number of residents with Stage II to IV PUs per 100 resident-days
C. Percentage of Stage II to IV PUs showing improvement using the Pressure Ulcer Scale for Healing (PUSH)20
D. Median days to complete healing
E. Percentage of admissions with risk assessment within 1 day
F. Percentage of Stage II to IV PUs with weekly assessment of healing
G. Number of residents with new facility-acquired Stage I PUs

For the following measure, the on-site coordinator used the registry to identify a random sample of residents and reviewed records identifying:

H. Percentage of residents with a PU risk assessment at least every 90 days
I. Percentage of at-risk residents (Braden score21 < 18) who have daily skin inspection
J. Percentage of at-risk residents using pressure-reducing support surfaces

Outcome measures A, B, and G were adjusted for facility size to generate rates that allowed ready comparison across sites and time, per 100 occupied beds per month, for number of new facility-acquired Stage II to IV PUs, residents with Stage II to IV PUs, and facility-acquired Stage I PUs.

The publicly reported prevalence rates for the participating facilities as presented on the Nursing Home Compare Web site were also collected.11 This measure, reported quarterly, combines all PUs, from Stage I through IV and reports stages using reverse staging, a method that characterizes a healing lesion as a lower stage. For example, a Stage IV lesion that starts filling in becomes a Stage III, and a Stage II that epithelializes but is still reddened becomes a Stage I. The National Pressure Ulcer Advisory Panel (NPUAP)5 and most experts now recommend against reverse staging, because a healing PU is never physiologically equivalent to a lower stage, but the current publicly reported quality measures use reverse staging and also combine Stages I to IV to calculate risk-stratified PU prevalence.

Each site entered the project’s PU data into the site’s NNHIC registry, using the NPUAP definitions of PU stages with no reverse staging. The registry tracked Stage I lesions separately, because the project did not want to suppress the possibility that aggressive PU screening and prevention may increase detection of transient lesions and because Stage I PUs are difficult to identify reliably. Late in the project, facility staff reviewed all PUs recorded in the registry and split Stage II from Stage III to IV so that analyses could examine the effect of stratifying.

The facilities’ performances are reported as medians and interquartile ranges. Results from the first 3 and last 3 months of reporting to assess overall improvement were compared, using the Wilcoxon signed-rank test, because the data were skewed. To assess whether averages were misleading, analyses were repeated with extreme values excluded. Associations between measures were evaluated by correlating each team’s performance on pairs of process and outcome measures over the last 3 months. Analyses also tested potential correlations between the NNHIC project’s incidence and prevalence rates and the following facility characteristics (from the CMS Online Survey Certification And Reporting (OSCAR) database): number of beds, number of residents, staffing hours per resident per day, presence of resident and family councils, type of ownership (for profit or not), Medicare and Medicaid participation, urban versus rural location, QIO versus corporation support for project activities, hospital based or freestanding, multi-nursing home ownership, and percentage bed occupancy.

Although facility-level data were used to conduct statistical tests for significance in Table 1, the effects were also illustrated at the resident level by plotting the total number of new nosocomial PUs and total numbers of residents with PUs, according to stage and month, in Figure 1.
November 2004. The registry collected data from November occurred in October 2003 and its closing conference in after the closing conference. The project's first learning ses-

The project trained QIOs and corporate partners in collaborative quality improvement and spread of improvements, as well as in the change package for PU prevention and healing. QIOs and corporate partners reported dissemination contact with other nursing facility staff for 8 months after the closing conference. The project's first learning ses-

Table 1. Changes in Selected Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Months 1–3*</th>
<th>Months 9–11*</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence: number of new nosocomial Stage II to IV per 100 occupied beds per month</td>
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<td></td>
<td></td>
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<tr>
<td>Stage II to IV</td>
<td>35</td>
<td>3.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Stage II</td>
<td>34</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>Stage III or IV</td>
<td>34</td>
<td>0.31</td>
<td>0</td>
</tr>
<tr>
<td>Prevalence: number of residents with PUs per 100 occupied beds per month</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage II to IV</td>
<td>35</td>
<td>4.0</td>
<td>2.8</td>
</tr>
<tr>
<td>Stage II</td>
<td>33</td>
<td>3.3</td>
<td>2.1</td>
</tr>
<tr>
<td>Stage III or IV</td>
<td>33</td>
<td>1.3</td>
<td>0.5</td>
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<tr>
<td>Evidence of healing: percentage of Stage II to IV PUs that showed improvement in PUSH score over the last month</td>
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<tr>
<td>Median days to healing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage II</td>
<td>29</td>
<td>52</td>
<td>33</td>
</tr>
<tr>
<td>Stage III or IV</td>
<td>10</td>
<td>150</td>
<td>49</td>
</tr>
<tr>
<td>Percentage of admissions with a Braden scale assessment within 1 calendar day of admission</td>
<td></td>
<td></td>
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<tr>
<td>Percent of Stage II to IV PUs with PUSH documentation weekly</td>
<td>34</td>
<td>45</td>
<td>22</td>
</tr>
</tbody>
</table>

* For each facility, baseline and re-measurement values were obtained by dividing the sum of the numerators by the sum of the denominators for the first 3 months (months 1–3) versus the last 3 months (month 9–11). For healing time of Stage III and IV pressure ulcers, baseline reflected months 3–5 to diminish the effect of long-standing lesions healed during the first 2 months of the project.

1 Wilcoxon signed-rank test, two-sided, a nonparametric paired difference t-test. Zero differences were omitted from the rankings, but are displayed in the medians and interquartile ranges (IQRs; 25th, 75th percentile).

2 Only 10 of 35 reporting facilities reported at least one healed Stage III or IV ulcer during both the baseline and re-measurement periods.

PU = pressure ulcer; PUSH = pressure ulcer scale for healing.

RESULTS

Thirty-two QIOs and seven multistate nursing home corporations each recruited one or more nursing homes to form an initial collaborative of 61 nursing homes from 39 states and the District of Columbia. Nine nursing homes and one corporate partner withdrew within the first few months because of competing priorities. Teams from 35 nursing homes reported data monthly through the registry; these were more likely to be not for profit (69% vs 31%) and located in rural counties (94% vs 67%) but otherwise did not differ from nonreporters on analysis of OSCAR data (Fischer exact test, \( P \leq .05 \)). Participating sites generally reflected U.S. nursing homes, except that, as expected because of the 75-bed requirement, the 52 sites in the study were larger, averaging 156 beds, compared with the U.S. average of 104.

Table 1 presents medians and interquartile ranges of the aggregate facility rates for the first 3 months and the last 3 months to summarize the performance of the facilities. As markers of compliance with best practices, completion of PU risk assessment within 1 day of admission increased from 87% to 99% (\( P = .002 \), Wilcoxon signed-rank test), and weekly documentation of healing increased from 45% to 67% (\( P = .004 \)). The participating facilities maintained strong participation in the process, with high rates of attendance at calls and learning sessions and many queries and comments on the e-mail discussion list. Teams readily adopted an experiential approach to implementing and evaluating changes. Many teams noted that their facility started to use the rapid-cycle change process to address other problems. Over time, teams mostly reported testing
changes to improve nutritional adequacy, processes of wound care, and monitors of repositioning. Some improved the skills of nursing assistants and practical nurses and put them in charge of managing major parts of the process. Many provided additional training for a wound care nurse and initiated regular prevention and treatment rounds. A few hired special staff to monitor reliability of turning and repositioning. Virtually all standardized their wound care dressings and started requiring review if no healing occurred within 2 or 3 weeks. Many teams reached out to their ambulance and hospital services to improve care for established residents and to make transfers safer. The full list of strategies that teams used to achieve improvements is posted on http://medqic.org, the technical support Web site for the QIO program. Participating nursing homes encountered repeated challenges to sustaining their quality improvement efforts, especially staff turnover in key positions, competing priorities, and staff shortages.

Regarding incidence and prevalence over the 11-month period, 35 facilities reported a total of 1,499 new Stage II to IV facility-acquired PUs, of which 217 (15%) initially presented as Stage III and IV. Although all facilities documented at least one new facility-acquired Stage II PU, seven had no new Stage III to IV lesions. To characterize the performance of the reporting facilities, Table 1 presents the change in median facility rates (with interquartile ranges) at the start and end of the project. To characterize the overall effect on residents across all facilities, Figure 1 plots the resident-level trends (sum of new nosocomial PUs or sum of lesions per 100 occupied beds per month in the first 3 months to 0 (25th, 75th percentile 0, 1.1) lesions per 100 occupied beds per month in the last 3 months (P < .001). Taken together, the incidence of Stage III and IV lesions declined 69% between the first 3 months and the last 3 months of the project (Figure 1). The decrease in median incidence of Stage II from 2.6 to 2.0 PUs per 100 occupied beds per month was not statistically significant (P = .16), but the composite incidence of Stages II to IV decreased from 3.2 to 2.3 per 100 occupied beds per month (P = .03). The decline in Stage III and IV prevalence from a median of 1.3 to a median of 1.1 affected residents per 100 occupied beds was not statistically significant (P = .12).

Figure 2 presents the medians of the facility rates for the current publicly reported quality measures: Stage I to IV PU prevalence stratified according to short- versus long-stay residents and according to risk group for the long-stay residents. The medians for all nursing facilities in the nation and for the 52 participating in this project are presented. Figure 2 shows that neither cohort improved. The trends in medians for the 35 reporting facilities were not different from the trends in medians of the 52 participating facilities (not shown).

The project’s two measures of healing did not improve: median percentage of Stage II to IV PUs with improving weekly PUSH scores (68% initially and 71% in the last 3 months) and median days to healing (52 and 150 days initially and 51 and 140 days in the last 3 months for Stage II and Stage III and IV, respectively). Considering first the full-thickness lesions, having and healing Stage III and IV wounds was uncommon. Of the 27 facilities with any healed lesions, only 10 had healed Stage III and IV lesions in the first 3 months and the last 3 months to allow comparison (Table 1). Some Stage III and IV lesions that healed during the project originated long before the project, so the time-to-healing measure included many days before the project. For Stage II lesions, facilities reported that they virtually always healed within a few weeks without progressing to deeper stages; most Stage II lesions healed so quickly that they were excluded because the data on healing tabulated only lesions that persisted for 30 days.

No association was found between process and outcome measures or between nursing home characteristics (using OSCAR data) and incidence and prevalence rates. Testing for outlier effects also identified no substantial effect.

When the incidence and prevalence rates of participating facilities had not changed by halfway through the project, the faculty investigated the possible reasons, using information from focus groups, one-on-one interviews, telephone conference calls, e-mail list communications, and the written monthly reports. Occasionally, a new PU
seemed to arise from a breakdown in the prevention procedures, and as others have noted,22–24 serious lesions often arose outside the nursing home. Stage II lesions arose somewhat erratically, and participants were not able to characterize risk factors beyond the obvious: poor or worsening condition, often with friction or shear forces on the skin. Participant teams were able to characterize the factors that seemed to lead to facility-acquired Stage III and IV lesions: residents with prior PUs and extensive scarring or with a combination of obesity, incontinence, and immobility. Teams also reported some lesions arising at the start of a serious decline in the resident’s overall status, when the setback seemed initially to fall within the usual day-to-day variation but evolved to signify an important complication. Finally, teams reported full-thickness PUs arising in younger and more assertive residents—from resident preference not to implement preventive strategies or because younger residents can survive remarkable injuries, complicated hospital courses, and immobility that would have caused death for older persons. In interviews and structured focus groups, participating teams could not recall Stage I or II lesions that progressed to Stage III or IV. Instead, deep lesions seemed to arise full-blown, even though demarcation and sloughing often took many days.

Measurement of incidence, staging, and healing posed challenges for participant teams. Some lesions arose from the combination of pressure and another etiology such as bunions, diabetic gangrene, and various venous and trauma etiologies. The registry’s measures of incidence could also be misleading when wounds diverged or converged. Teams varied in reporting Stage II lesions that arose close to death. Because the PUSH tool did not subdivide lesions larger than length \times width = 24 \text{ cm}^2, all larger lesions had this ceiling score, a fact that blunted potential evidence of healing of the largest lesions.

The faculty noted that many participating teams used diagnostic and treatment procedures for which evidence is limited, such as sonograms for initial diagnosis of the extent of deep injury or topical diphenylhydantoin on nonhealing wounds.

Eight months after the final meeting, participating teams, QIOs, and corporate partners reported spreading insights on how to implement PU best practices to 5,359 non-NNHIC facilities. Some QIOs reported collaboration across state lines, and many reported convening emergency medical services personnel, hospitals, home care agencies, and nursing homes to develop shared protocols for PU prevention and care, especially during resident transfer.

DISCUSSION

Thirty-five self-selected nursing homes used collaborative quality improvement to reduce the incidence of new nosocomial Stage III and IV PUs from a median of 0.31 (25th, 75th percentile 0, 1.1) to a median of 0 (25th, 75th percentile 0, 0.42) per 100 occupied beds per month, a decrease of 69%, but the publicly reported PU quality measure (PU-QM) for overall PU prevalence at these same homes did not improve. This finding suggests that the PU-QM may be insensitive as a mark of quality care and as a monitor of quality improvement. The PU-QM fails to distinguish between partial- and full-thickness ulcers by aggregating all stages into a single measure of prevalence and by using reverse staging.

Stage I and II lesions are common but cause little suffering in themselves. Because they did not correlate closely with risk of Stage III and IV lesions and because the healing process is different, combining Stage I and II with Stage III and IV PUs makes it difficult to monitor, target, and address more serious lesions. Another recent quality improvement collaborative23 had no effect upon incidence of all stages combined, perhaps because that measure would obscure a real effect, as it did in this project. The participating teams here showed significant reductions in Stage II to IV PU incidence, although the improvement was less dramatic than for full-thickness lesions alone.

Stratifying PUs according to stage turned out to be important both because the partial-thickness lesions are so common and relatively unresponsive to implementation of good practices and because the causes, prevention, treatment, and effect on quality of life differ between partial- and full-thickness PUs. Unfortunately, reverse staging used in the MDS 2.0 precludes using MDS 2.0 data for stratification according to true severity of the injury. Thus, improving the PU-QM will require changes in data collection, not just in calculation of the rates. Changes now under consideration for MDS 3.0,25 including elimination of reverse staging, distinguishing between community- and facility-acquired PUs, and recording of wound dimensions, will increase the potential usefulness of MDS data for quality improvement.

Designing optimal measures of PU prevention and care requires developing monitors of prevention and healing of full-thickness lesions and of healing of Stage II lesions. Prevention of partial-thickness lesions did not appear to be closely tied to implementation of more-optimal practices. Onset of Stage I and II lesions may well be appropriate for clinicians and facilities to use as a trigger for clinical interventions, rather than making this a part of a publicly reported quality measure.

In-facility onset of new Stage III and IV PUs may be a more-appropriate measure of prevention, especially those with onset more than a few days after admission. Stratification or risk adjustments may be needed to manage serious PUs arising close to death, residents who cannot or will not comply, and other high-risk situations.26 Process measures, such as reliability and timeliness of risk assessment and use of effective support surfaces, would provide more-useful information about implementation of good practices than monitoring prevalence or incidence of superficial wounds. Preventing lesions arising near the time of transfers probably requires learning how to have the transferring and the receiving party both bear responsibility for the resident’s safety. Incentives for high quality might best apply to multiple providers in an area to encourage improved care near and during transfers.27 Rather than focusing on the rates for each nursing home, perhaps what matters most to the elderly person (or those planning or evaluating care for elderly people) is the performance of the whole care system in their area with regard to the lifetime risk of developing Stage III and IV PUs, and perhaps quality measures can evolve in that direction.

The results of this project challenge some prevailing assumptions. Advocates and clinicians have mostly
presumed that the rate of deep PUs (Stage III and IV) correlates with the rate of superficial ones (Stage I and II) and that PUs progress from less-severe to more-severe lesions. The participants and faculty concluded, as have others, 31,32,33,34 that Stage I and II lesions and Stage III and IV lesions may reflect different causal pathways and, furthermore, that Stage I and II lesions heal quickly and have little correlation with risk for deep lesions.

The fact that this project’s measures of healing did not improve may mostly reflect the slowness of the process and the shortcomings of this project’s measures (e.g., longstanding lesions that healed had their entire duration counted toward the measure of “days to healing” even if a substantial portion of that duration preceded the project’s intervention period, and the rolling 3-month averages limited the effective observation period to 5 months).

Measurement of healing posed substantial problems. Because the PUSH tool classifies all ulcers with an area greater than 24 cm² as very large and gives them one score, substantial healing (decrease in wound area) may occur without being reflected by the PUSH tool. With healing, a large wound could become two or more smaller ones, one of which counted as a new ulcer. On the other hand, a lesion shrinking to an undermined sinus tract could look like healing on the PUSH tool, although it sometimes marked the onset of permanent non-healing.

Measures of the processes of care posed some challenges. For example, “weekly” reporting of PUSH scores for wound size required repetition within seven calendar days. A holiday or snowstorm postponing scoring by as little as one day meant that the week’s scores were late. That implementation error weighed as heavily as if the measured process was never done. Although this standard allowed rigorous reporting in this project, it is probably reasonable to allow the day of the week for measuring a wound to vary by a day or two.

Although quality improvement usually aims to translate insights from research into practice, this project demonstrated the potential for clinical quality improvement collaboratives to inform research priorities. The possible disconnection between superficial and deep PUs calls for a more-careful assessment of this phenomenon. Some participating facilities used unproven tests and treatments, practices that will continue indefinitely without rigorous testing. Objective data documenting the comparative merits of pressure-relieving surfaces, including their costs and durability, were unavailable. Devices to monitor and signal discrepancies in repositioning merit development. Whether pressure-relieving surfaces or supplemental nutrition prevent or heal PUs is not clear, 31 although this project’s participants teams invested heavily in these endeavors, and some reports show advantages of improved nutrition. 32,33 Addressing these research questions may yield more-effective use of resources and enhanced ability to assign accountability equitably and support facility staff, yet no responsive process exists to prioritize research issues that arise during the work of clinical quality improvement. Allowing multisite quality improvement work to generate and analyze patient-level data would anchor an efficient approach to some important research questions.

A recent editorial hypothesized that PU rates may not reliably indicate nursing home quality because of small numbers in each facility, the inadequacy of case-mix adjustment, and the lack of close correlation between preventive strategies and outcomes. 34 The editorial urged more research, and the current project illuminates a more-specific possibility. This project did not significantly affect the overall rate of PUs but substantially reduced the rate of Stage III and IV PUs. Other studies are beginning to examine full-thickness lesions separately, 32,33,35 and the current data suggest that this is wise.

This project relies upon observational data and cannot control for potential confounders beyond comparing with national secular trends. It also depended upon self-selected, motivated nursing homes with one-on-one support for improvement implementation; thus, generalizing the findings requires caution.

The national clinical quality collaborative process was a remarkable engine for generating and spreading good practices. All of the participating teams worked with their state QIO or corporate clinical quality experts, and many became ambassadors for practical implementation in other facilities.

Medicare’s QIO Program covered the costs of meetings, coordination, development of the registry software, support of a Web repository of tools, and documentation, at a total cost of approximately $1.4 million. Individual facilities and corporations paid for their own travel and on-site work. The project yielded a useful toolkit of change strategies (the NNHIC Collaborative Handbook, available at http://medqic.org) and registry software to track clinical process improvements (available on request from Qualis Health); a vigorous trial of implementing best practices; a reasonable benchmark of achievable excellence; a substantial proven record of dissemination of good practices; and a number of insights into quality measurement, public reporting, and research priorities. Finally, motivated and diligent nursing facilities, using current best practices, reduced the number of new facility-acquired full-thickness PUs 69% in less than a year.

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Author Contributions: Joanne Lynn, Nancy Bergstrom, and Judith Ryan were faculty for the project; Jeff West was the Project Manager for Qualis; Susan Hausmann was the project data analyst; David Gifford led the nursing home resource center for QIOs (at Quality Partners of Rhode Island); and Rachel Nelson and Paul McGann were the Project Leaders at the Centers for Medicare and Medicaid Services.
Services. All of the authors contributed to the project and the manuscript.

Sponsor's Role: CMS and Qualis Health were engaged throughout the project, and both organizations reviewed this manuscript before submission.

REFERENCES


