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Hourly Rounding to Improve Nursing Responsiveness: A Systematic Review

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Abstract

Objective—Synthesize the evidence concerning the effect of hourly rounding programs on patient satisfaction with nursing care, and discuss implications for nurse administrators.

Background—Patient satisfaction is a key metric that influences both hospital ratings and reimbursement. Studies have suggested that purposeful nursing rounds can improve patient satisfaction but the evidence to date has not been systematically examined.

Methods—Systematic review of published literature and GRADE analysis of evidence regarding nursing rounds.

Results—There is little consistency in how results of hourly rounds were measured, precluding quantitative analysis. There is moderate-strength evidence that hourly rounding programs improve patients' perception of nursing responsiveness. There is also moderate-strength evidence that these programs reduce patient falls and call light use.

Conclusions—Nurse administrators should consider implementing an hourly rounding program while controlled trials discern the most cost-effective approach.

Hospital stays subject patients and their families to significant stress. In addition to facing bewildering medical conditions that require tests and treatments from doctors, nurses and other healthcare personnel, patients are placed in dependent roles and become socially and emotionally vulnerable. They are compelled to request assistance with basic needs as repositioning, eating and elimination. Unfamiliar with hospital routines and how to get needs met, patients access the primary mechanism at their disposal; the nurse call button. Expectations and perception regarding responsiveness to this means of communication may depend on the reason for initiating the request. For example, if a patient has a question about a scheduled procedure, waiting a short period of time may be acceptable. If a patient has

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Conflicts of Interest

For the remaining authors, no conflicts were declared.

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received a diuretic and is experiencing bladder fullness and a sense of urgency, waiting a short period of time for bathroom assistance may seem too long. Intentionally checking on patients at regular intervals, known more colloquially as hourly rounding, has been suggested as a primary mechanism to address basic patient needs as well as enhance patient safety and experience (1).

Published reports have suggested that systematic and purposeful rounding by nursing results in improved patient satisfaction (2). This observation is especially relevant in our current era of value-based purchasing, where reimbursements are directly tied to patient satisfaction scores (3). Nursing responsiveness is an important factor in a patient's experience of care during hospitalization and is captured in most patient satisfaction surveys. For example, the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, a publicly-reported survey that informs Medicare reimbursement levels (4), has 2 questions relating to nursing responsiveness. Patients are asked "During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it?" and "How often did you get help in going to the bathroom or in using a bedpan as soon as you wanted?"

The practice of proactive and regular checks of hospitalized patients to decrease patient anxiety has been included in nursing curricula since the mid-1970s, although not tested in formal trials. More recently, Woodard articulated an underlying rationale for proactive rounding in the "help uncertainty" model (5). When patients are unable to comprehend nursing workflow and cannot predict when a nurse will be available for physical and emotional assistance, they worry that no one will be available to respond to immediate needs (i.e., they experience "help uncertainty"), anxiety levels rise, and inappropriate coping mechanisms may come into play (e.g., getting up to go to the bathroom alone shortly after receiving a pain medication). By taking the initiative to address basic needs such as use of the bathroom ("potty"), positioning, pain control, and proximity of personal items using a structured format, nurses can decrease patient anxiety and minimize help uncertainty (1).

In addition to reducing patient anxiety and fear, systematic and proactive nurse rounding has been associated with decreased use of call lights. Surveys conducted with nurses and patients indicate that pain management, personal assistance, bathroom assistance and equipment alarms (i.e., intravenous pumps) were among the top 5 reasons for pushing the call bell (6, 7). Structured hourly rounding which addresses these important "Ps" may thus allow nurses to provide more responsive and uninterrupted care.

The only summary appraisal of structured rounding interventions to date is a narrative review published by Halm in 2009 (8). She concluded that hourly rounding reduced call light use and increased patient satisfaction, but did not report the quantitative results. As that review lacks the latest evidence as well as important details about the interventions, we performed an updated systematic review to help inform evidence-based decision-making at the hospital and health system levels.

Introducing structured hourly rounding to nursing practice may be challenging for nurse administrators for a variety of reasons, particularly at a time when future hospital

reimbursement levels are uncertain. Nurse administrators must account for any changes in how nurses spend their time, and determine whether increases in staffing are needed and will provide benefits that exceed costs. To make a persuasive case for changing nursing care delivery processes, nursing leaders must understand the evidence supporting the change, and use it to gain the support of other hospital and health system administrators. Systematic reviews of clinical evidence are an effective way to inform stakeholders regarding the value of changes in nursing practice. This systematic review on hourly nursing rounds provides hospital nurse administrators with the evidence necessary to make decisions around program implementation and allocation of nursing resources.

Methods

The systematic review process followed the PICO structure (Patients, Intervention, Comparison, Outcomes) (9, 10) for defining the scope of the review and the studies to be considered. The a priori protocol (Supplemental Table #1) is a key component of a systematic review that ensures an objective process for including and excluding studies to be reviewed (11).

Medline, EMBASE, and CINAHL were searched for published studies including systematic reviews. Searches were completed in December 2012 and updated in July 2013. We did not restrict search results by language or date of publication. The general approach was to combine a term for patient satisfaction or responsiveness with a term for hourly rounding or call buttons using an “AND” Boolean search operator, and then combine all of the individual results with an “OR” operator. We also included a search combining terms for responsiveness and patient satisfaction with filters for controlled clinical studies. Detailed syntax of the searches is provided in the supplemental tables (Supplemental Table #2; Supplemental Table #3; Supplementals Table #4). In addition to searching the above databases, we reviewed the bibliography of Halm’s review (8) for articles that may have been missed by the searches. Duplicate references were deleted before articles were screened for further review.

Article inclusion and exclusion was done in accordance with the stated protocol. An experienced research analyst (MDM) reviewed the titles and abstracts of all articles found by the searches and marked articles for retrieval. In uncertain cases, the article was marked for retrieval. One hundred randomly-selected search results were audited by a 2nd analyst (JGL) for quality assurance; there was complete agreement between the 2 analysts. All marked articles were retrieved in full text, and the 2 research analysts independently determined whether or not each retrieved article met the stated inclusion criteria. When studies were excluded, the reason for exclusion was documented (Supplemental Table #5). Disagreements between the 2 analysts were minimal and resolved through joint review of full text articles and discussion.

Methods and results of each included study were abstracted into evidence tables by the 1st research analyst. The analyst also identified potential sources of bias or uncertainty in the studies, noting them in a comments column. Both abstracted data and assessment of bias for all included studies was verified by the second analyst. The protocol included a systematic

assessment of study quality using a modified version of the Jadad scale (12) for evaluating available randomized trials, and quantitative synthesis of study results using meta-analysis if the quantity and quality of data permitted.

After data abstraction was complete, the strength of the overall evidence base for each outcome of interest was assessed using the GRADE system (13–15). GRADE uses a 4-point scale for evidence quality: “high,” “moderate,” “low,” and “very low.” Evidence for a particular outcome is assigned an initial category based on the type of studies (randomized or non-randomized) informing that outcome, and then the grade is decreased or increased based on criteria of quality, quantity, consistency, directness, and magnitude of effect.

Results

Evidence Review

From an initial result of 1,279 database hits and 11 review citations, we identified 16 published studies meeting the inclusion criteria. There were numerous duplicate references in the results from the different searches, suggesting that the searches did capture nearly all of the relevant studies. The PRISMA diagram (Supplemental Digital Content #6) shows the number of articles under consideration at each step of the process.

Nine articles we identified were not included in Halm’s review. Eight of them were published after the searches for the previous review were conducted, and 1 article (16) was missed by that review. Five of the eleven studies cited by Halm’s review were not found by our searches. Three of them were published only in abstract form and had not been indexed. They did not meet our a priori inclusion criteria because abstract publications are not detailed enough for us to evaluate the quality of the study. The others (17, 18) met our inclusion criteria and were included in the analysis.

Table 1 describes the design of each of the studies meeting our inclusion criteria. There were no randomized controlled trials, and nearly all the articles described studies of a “pre-post” design. Because of the lack of randomized trials, we could not apply the modified Jadad scale as planned.

Table 2 summarizes the interventions tested in these studies. Some had hourly rounding, some had 2-hourly, and some had hourly during day and evening hours and 2-hourly during late nights and early mornings. Nearly all the studies reported use of a script or structure of tasks to be performed for each patient. Those tasks usually corresponded to the “four P’s” and some of the investigators cited Meade’s seminal report defining that intervention (1) as the model for their programs. Cann et al. (19) tested a “Practice Partnership Model of Care” in which hourly rounding was combined with changes to the layout of the nursing unit, regular hand-off of patients at the bedside, and partnerships between nurses. Because the investigators made all the changes in care at the same time, the effects of the additional changes in care beyond the hourly rounding program could not be assessed.

There was little consistency in how results were reported across studies. A variety of patient survey instruments were used to assess perceived responsiveness of hospital staff, including

Press Ganey™ and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS). Many studies did not fully report patient satisfaction and responsiveness results, instead reporting only the direction and significance, if any, of the effect. This heterogeneity of reporting precluded any quantitative synthesis of the data.

Study results are shown in Table 3. Nine of the 11 studies that reported overall patient satisfaction scores found improvements in that measure; none reported any decrease. Of the 7 studies that reported a significance test on the results, 4 found statistically significant improvements in patient satisfaction.

“Responsiveness” is a component of most patient satisfaction surveys. While the wording of the question varies, it typically refers to whether nurses or other caregivers responded promptly when the patient activated the call light. This was not reported as frequently as overall patient satisfaction. When it was reported (Table 3), results tended to fall into 1 of 2 extremes: either little or no effect (3 studies) or a large and statistically significant positive effect (2 studies). One additional study reported increased responsiveness but did not provide numeric results. The studies reporting a significant gain in responsiveness had the lowest baseline scores on this item, suggesting that there is a ceiling effect, and that hourly rounding will have the greatest impact in units where there is a perceived problem with responsiveness.

Ten of the published studies of hourly rounding reported the effect on patients’ use of call lights, an outcome that is of particular interest to nurse administrators. Call light use fell substantially in all the studies where it was measured. Decreases ranged from 23 % to 70 %: the median reduction was 54 %. In most studies, the results had strong statistical significance. Investigators consistently said that hourly rounds reduced calls for patient assistance with positioning, toileting, and other minor needs, while calls for more serious needs were not affected.

One might expect that proactive rounds in which patients are regularly and frequently asked if they need assistance with using the toilet would also reduce patient falls, because patients are less likely to have an urgent need to go to the toilet before a caregiver can assist them. Among the studies in our review, 9 also measured this outcome. The reported reduction in falls ranged from 24 to 80 %, with a median reduction of 57 %. Falls were not common events in these studies, so the statistical power to detect differences was limited, but 2 studies were able to report a statistically significant decrease in falls.

Another element in most hourly rounding programs was to change the patient’s position if necessary. This would be expected to reduce pressure ulcers, but only 1 study actually measured the impact of an hourly rounding program on this outcome, finding too few instances of pressure ulcers to make any conclusions possible (20).

In some studies, rounding was done every 2 hours instead of every hour (1, 5, 16). Beneficial effects on patient satisfaction and call light use were still observed, but the magnitude of the effects appears to be less than with hourly rounding. The 1 trial that did compare rounding intervals (1) also found this kind of “dose effect.”

GRADE Assessment

The GRADE analysis (Table 4) systematically evaluates the quantity, quality, and consistency of evidence and the effect size of the results to assign a rating to the evidence base as a whole for the effect of each intervention type on each outcome of interest. Given that the evidence base for all interventions and outcomes consisted of observational pre-post studies, the initial grade of evidence for all outcomes was low. Evidence on perceived responsiveness of nursing staff was downgraded for inconsistency because some studies found little or no effect while others found a large effect.

The GRADE system allows for upgrading of the final rating if there is evidence the effect of an intervention is large or dose-dependent. A single-level upgrade can be applied if the magnitude of an effect is a factor of two or more. This criterion was met for the outcomes of call light use and patient falls, but because the size of the effect only slightly surpassed the threshold, we opted not to apply a 2nd upgrade for the limited evidence suggesting a dose-response effect. We considered the impact of hourly rounding on patient satisfaction and perceived responsiveness to also be large enough to merit an upgrade, though in the case of responsiveness that upgrade was canceled out by the downgrade for inconsistency. The final evidence grade was “moderate” for 3 of the 5 outcomes evaluated.

Discussion and Implications for the Nurse Executive

This systematic review of 16 published articles found there is substantial evidence that hourly rounding has beneficial effects, particularly on the outcomes of patient satisfaction, call light use and patient falls. The benefits on patient satisfaction scores and perceived responsiveness appear to be larger for units that do not perform well at baseline, which supports a hypothesis that there is a ceiling effect on the impact of hourly rounding. Application of the systematic review methodology uncovered several important limitations to the applicability of the results, which may not have been recognized had the articles been analyzed in a less rigorous way. Familiarity with issues such as methodological bias, publication bias, and generalizability can provide nurse executives with important insights into this literature as they consider using it as a foundation for implementing hourly rounding in their institutions.

Among the articles included in this review, there was considerable variability in the study protocols (i.e. the way the studies were carried out and how the results were measured). Interventions consistently aligned around the “four P’s” of pain control, toilet or bedpan needs (“potty”), patient positioning, and a reassuring presence of the nurse. There were, however, variations in the frequency of rounding, and staff members completing the rounds (registered nurses vs. assistive personnel), which could be a major consideration for nurse executives. None of the studies provided data from which we could compare the effectiveness of these variations, aside from the hourly and 2-hourly rounding in Meade’s study as described above.

The methodological approaches of the studies included in this analysis may bias their results in favor of hourly rounding, and/or make them less generalizable to units outside the study setting. Of particular note is that none of the studies were randomized; they instead were of

pre-post study design. The ability to account for the impact of interventions or changes that may have occurred concurrent to the study intervention is limited with pre-post study designs. Therefore, a conclusive causal relationship between the implementation of hourly rounds and the study outcomes cannot be made. This limitation is particularly relevant if units with particularly poor patient satisfaction or responsiveness scores are more likely to study hourly rounding. Regression to the mean suggests that these particular units will likely improve regardless of any changes in care, making it difficult for nurse executives to understand the true impact of the intervention and plan future initiatives.

An evidence base comprised mostly of pre-post studies also is at increased risk of publication bias. Not only will investigators opt not to seek publication when practice changes don't produce the desired effect, but in order to encourage others to adopt these practices, the authors of published studies may emphasize their most positive results and omit results that did not favor their intervention.

When evaluating published reports of pre-post studies, nurse executives should identify whether or not the authors followed an a priori research protocol. Few of the studies in this systematic review reported using such a protocol, so the extent of possible reporting bias is not known. One exception is the report by Meade et al. who reported after the fact that results from about 1/3 of participating hospitals were excluded because more than 5 % of data elements were missing from their logbooks (1).

The selection, training, and supervision of personnel in the studies may have also introduced bias and limited generalizability. In Kessler's study (21), project leaders took pains to ensure maximum staff compliance with the hourly rounding protocol, including bi-weekly meetings about the program and having staff members sign pledges to complete the rounds. The level of intervention and availability of resources in Kessler's study exceed the level of resources that typically would be available in most clinical environments, making replication challenging for nurse administrators. In Berg's study (22), some staff members declined to give consent for having records from their shifts used in the study. If the hourly rounding program was more or less effective for the patients of these staff members, the results published in the study may not accurately represent the overall effect of the program.

Moreover, bias can arise when nurses know their performance and the impact of a practice change are being monitored for research purposes. If data are only collected during the last week of each month, for example, such as in the study by Culley et al. (23), then staff may feel less motivation to carry out the hourly rounding program during the other weeks. Automated data collection, which is often used to measure call light usage, allows for more complete collection of data and reduces risk of this bias. The selection of units may also limit generalizability of the findings. For their study, Berg et al (22) selected a unit that had a stable patient census and acuity, a climate where one would expect changes in practice to be easiest to implement. Woodard et al. (4) selected a medical-surgical unit where the charge nurse conducted scripted rounds and the 12 hour shift patient-nurse ratio was 3: 1 on days and 4 or 5: 1 on nights. The authority figure of the nurse conducting the rounding intervention and the relatively low patient ratio are additional plausible explanations for increases in patient satisfaction.

Conclusions

This systematic review determined that the evidence supporting the use of hourly rounding in inpatient care was of low to moderate strength. While the individual studies are of weak research design and have inconsistent reporting quality, the quantity and consistency of the evidence on hourly rounding leads us to conclude that it improves patients' perceptions of nursing staff responsiveness in units where this may have been a problem, reduces patient falls and call light use, and improves patient satisfaction scores. Additional evidence is not likely to refute these conclusions; therefore nurse administrators should invest in the development of hourly rounding programs adapted to their local circumstances. Accordingly, this presents an opportunity for nurse executives to support nursing research initiatives within their institutions. Trials of different ways to meet the hourly rounding imperative are warranted. Sustaining hourly rounding places a considerable strain on nursing resources, and while it may be more cost-effective for nursing aides to fulfill the "four Ps" protocol, we do not know whether they will have the same impact on patient satisfaction scores as hourly rounding by registered nurses. Future studies should measure and report all of the outcomes outlined in Table 3. Such research will yield more precise findings regarding hourly rounding processes and their impact on patient outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Study design

Study	Study design	Setting Number of patients	Intervention	Duration of control Duration of study	Comment
Cann 2012 (19)	Pre-post	Surgical unit N = 2,184	Practice Partnership Model of Care (see text)	6 months 6 months	Study done in Australia Results reported per 100,000 patient-hours
Kessler 2012 (21)	Pre-post	Medical-surgical unit N not reported	Hourly rounds with specified tasks (two-hourly from 12 am to 6 am)	1 year 5 years	Data reported by fiscal year Used Press Ganey survey questions
Olinich 2012 (24)	Pre-post	Two medical-surgical units. N = 4,418	Hourly rounds with specified tasks (two-hourly from 10 pm to 6 am)	6 months 6 months	Survey method not reported
Tucker 2012 (25)	Pre-post	Two orthopedic units N = 2,170	Hourly rounds with specified tasks	3 months 3 months	One-year data also collected
Berg 2011 (22)	Pre-post	Medical-surgical unit N responses = 286	Hourly rounds with specified tasks	5 weeks 5 weeks	Used Press Ganey survey questions Only 66% of staff gave consent to have records used
Saleh 2011 (20)	Pre-post	Inpatient stroke unit N = 104	Hourly rounds with specified tasks (two-hourly from 10 pm to 6 am)	4 weeks 4 weeks	Study done in Saudi Arabia
Gardner 2009 (26)	Non-random	Two adult surgical units N = 129	Hourly rounding weekdays from 4 pm until 10 pm, with specified tasks	Parallel groups 8 weeks	Study done in Australia Described as "pilot study"
Woodard 2009 (5)	Pre-post	Adult surgical unit N not reported	Two-hourly rounds with specified tasks	1 quarter 3 quarters	Used NRC Picker patient survey Results reported by calendar quarter Start date of intervention not reported
Assi 2008 (17)	Pre-post	Oncology unit N not reported	Hourly rounds with specified tasks	Not reported 1 month	Described as "pilot study" One-page publication of study and results
Bourgault 2008 (27)	Pre-post	All inpatient units (three hospitals) N not reported	Hourly rounds with specified tasks (two-hourly from 10 pm to 6 am, no rounding if patient asleep)	5 months 7 months	Used HACHPS survey questions
Culley 2008 (23)	Pre-post	Step-down, med., surg. units N not reported	Hourly rounds: details not reported (two-hourly from 10 pm to 6 am)	4 weeks 4 weeks	Poor quality of study reporting
Sobaski 2008 (28)	Pre-post	Cardiac telemetry unit N not reported	Hourly or two-hourly rounds 7 am to 10 pm with specified tasks	3 months 3 months	Used Press Ganey survey questions
Tea 2008 (29)	Pre-post	Orthopedic unit N = 202	Hourly rounds with specified tasks	6 months 9 months	Outcomes measures primarily had to do with process
Weisgram 2008 (18)	Pre-post	Step-down telemetry unit N not reported	Hourly rounds with specified tasks (two-hourly from 10 pm to 8 am)	Not reported 30 days	
Torres 2007 (16)	Pre-post	One inpatient unit N not reported	Two-hourly rounds with specified tasks	3 months 9 months	Poor quality of study reporting

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Study	Study design	Setting Number of patients	Intervention	Duration of control Duration of study	Comment
Meade 2006 (1, 30)	Pre-post and non-random	27 diverse units (14 hospitals)	Hourly or two-hourly rounds with specified tasks (two-hourly from 10 pm to 6 am)	2 weeks 4 weeks	Used various patient surveys including Press Ganey

NRC—National Research Corporation
 HCAHPS—Hospital Consumer Assessment of Healthcare Providers and Systems

Table 2

Intervention details

Study	Study objective	Interval	Rounding intervention		Comment
			Who performs rounds	Structured task list/scripts	
Cann 2012 (19)	Evaluate alternative model of nursing care	1 to 2 hours	Not reported	Not reported	"Practice partnership model" included several changes to practice besides hourly rounding
Kessler 2012 (21)	Reduce falls Increase patient satisfaction	Hourly (see comment)	Nurses and assistive personnel	Yes	Unit director and unit educator also made daily rounds on each patient. Initially, rounds were every 2 hours from 12 am to 6am, but changed to hourly at all hours at an unreported point during the study
Olrich 2012 (24)	Replicate previous study (Meade)	7 ^{am} -Hourly	Nurses and assistive personnel	Yes	
Tucker 2012 (25)	Reduce falls	Hourly	Nurses and assistive personnel	Yes	
Berg 2011 (22)	Improve nursing efficiency Increase patient satisfaction	Hourly	Not reported	Yes	Rounding tool also included disease specific needs (e.g. for cardiac patients: telemetry, chest pain, and shortness of breath assessment; for post-op patients: urinary output, pain assessment)
Saleh 2011 (20)	Reduce call light use Increase patient satisfaction Reduce falls Reduce bedsores	7 ^{am} -Hourly	Nurses and assistive personnel	Yes	Male patients only
Gardner 2009 (26)	Improve nursing efficiency Increase patient satisfaction	Hourly, 4 pm to 10 pm only	Nursing assistants	Yes	
Woodard 2009 (5)	Increase patient satisfaction Reduce falls Reduce call light use	Two-hourly	Charge nurse	Yes	
Assi 2008 (17)	Reduce call light use Increase patient satisfaction	Hourly	Nurses	Yes	
Bourgault 2008 (27)	Increase patient satisfaction	7 ^{am} -Hourly	Nurses and assistive personnel	Yes	In some but not all units, clinical support staff rounded on odd hours and nurses on even hours
Culley 2008 (23)	Reduce call light use	7 ^{am} -Hourly	Not reported	Unclear	Investigators had near daily contact with staff members to give feedback and answer questions

Study	Study objective	Interval	Rounding intervention		Comment
			Who performs rounds	Structured task list/scripts	
Sobaski 2008 (28)	Increase patient satisfaction	1 to 2 hours, 7 am to 10 pm only	Nurses and assistive personnel	Yes	If patients were found to be asleep, a limited set of hourly tasks were completed
Tea 2008 (29)	Increase patient satisfaction	Hourly	Not reported	Yes	
Weisgram 2008 (18)	Replicate previous study (Meade) Reduce falls	7- Hourly	Nurses	Yes	
Torres 2007 (16)	Increase patient satisfaction	Two-hourly	Not reported	Yes	
Meade 2006 (1, 30)	Reduce call light use Increase patient satisfaction Reduce falls	7-1 or 2 hours (see comment)	Nurses and assistive personnel	Yes	3 groups in study: (1) control; (2) hourly rounding, with two hourly rounding from 10:00 pm to 6:00 am; (3) two-hourly rounding at all times

⁷ Two-hourly rounding during late-night/early morning hours (typically 10:00 pm to 6:00 am), hourly rounding at all other times.

⁷ Assistive personnel and nurses rounded on alternate hours.

Table 3

Study results

Study	Intervention Comparison	Patient satisfaction	Responsiveness	Call light use	Falls	Comment
Cann 2012 (19)	"Practice Partnership" Previous care	See comment	Not reported	523 1,277 p < 0.001	10.9 13.9 p = 0.50	Trend towards increased commendations and a smaller increase in complaints
Kessler 2012 (21)	Hourly rounding Previous care	Not reported	82.1 86.7	Not reported	2.19% 5.46%	Statistical significance of differences not reported
Olrich 2012 (24)	Hourly rounding Previous care	No significant change (p = 0.58)	Not reported	No conclusions (see note)	2.6 per 1,000 3.4 per 1,000 p = 0.67	Call light use data affected by one delirious patient No significant difference in call light use after that patient was discharged
Tucker 2012 (25)	Hourly rounding Previous care	Not reported	Not reported	Not reported	1.6 per 1,000 days 4.5 per 1,000 days p = 0.07	Not all staff allowed data from their shifts to be used
Berg 2011 (22)	Hourly rounding Previous care	Not reported	89.3 88.9 p = NR	7.62 per day 11.32 per day p = 0.001	Not reported	Not all staff allowed data from their shifts to be used
Saleh 2011 (20)	Hourly rounding Previous care	Improved p = NS	Not reported	29.3 ± 7.4 98.8 ± 21.2 p < 0.001	4 25 p < 0.01	Falls counted over duration of study, call lights counted as monthly rate Pressure ulcers: pre-intervention: 2; post-intervention: 1 (p = NS)
Gardner 2009 (26)	Hourly rounding Control	No significant diff. between groups	Not reported	Not reported	Not reported	No quantitative patient satisfaction data reported
Woodard 2009 (5)	Two-hourly Previous care	Approx. 77 Approx. 59	Not reported	Approx. 6/day Approx. 13/day	Approx. 4 Approx. 10	Data approximated from published graph; numeric results and units of measure not reported Significance of results not reported
Assi 2008 (17)	Hourly rounding Previous care	Increased	Not reported	Decreased 63%	2.7 per 1,000 6.1 per 1,000	Results may have been selectively reported
Bourgault 2008 (27)	Hourly rounding Previous care	66.87 59.95 p = 0.048	56.55 48.76 p = 0.01	Not reported	No significant change	Patient satisfaction score is "overall rating of care" Baseline call light data not collected
Culley 2008 (23)	Hourly rounding Previous care	Increased	Not reported	Reduced by 31% to 77%	Not reported	Very little quantitative data reported, no baseline results reported Call light reductions by unit: step down=77%; medical unit=56%; surgical unit=31%
Sobaski 2008 (28)	Hourly rounding Previous care	Not reported	88.6 87.0	Not reported	Not reported	Responsiveness measured as "promptness of response to call light"
Tea 2008 (29)	Hourly rounding Previous care	60.0% 50.1%	84.6% 47.6% p < 0.001	2.509/2 wks 3.591/2 wks	Not reported	Responsiveness measured as percentage of patients agreeing with statement: "staff always responds promptly to requests"

Study	Intervention Comparison	Patient satisfaction	Responsiveness	Call light use	Falls	Comment
Weisgram 2008 (18)	Hourly rounding Previous care	Not reported	Not reported	Decreased 23%	Not reported	Very little quantitative data reported, no baseline results reported
Torres 2007 (16)	Two-hourly Previous care	Increased 17%	Increased	Decreased 71%	Not reported	Very little quantitative data reported, no baseline results reported Significance of satisfaction improvement not reported
Meade 2006 (1, 30)	Hourly rounding Previous care	91.9 79.9 p = 0.001	Not reported	8,315 13,216 p = 0.007	12 25 p = 0.01	Data from only 14 of 22 hospitals (27 of 46 units) used in analysis Falls counted over duration of study Pre-post data also reported for a control group of units with no intervention
	Two-hourly Previous care	82.1 70.4 p = 0.001	Not reported	11,507 14,201 p < 0.05	13 19 p = NS	

NS—not significant

GRADE Analysis

Table 4

Intervention	Outcome	Conclusion	Quantity and type of evidence	Starting level of evidence strength (GRADE)	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Strong or very strong assn.	Dose-response	Confounders	Final level of evidence strength (GRADE)
‡_Hourly rounding	Patient satisfaction	Improved	11 pre-post	Low	0	0	0	0	0	+1	0	0	Moderate
	Perceived responsiveness	Improved where responsiveness had been a problem.	6 pre-post	Low	0	-1	0	0	0	+1	0	0	Low
	Call light use	Reduced by a median of 54%	10 pre-post	Low	0	0	0	0	0	+1	0	0	Moderate
	Patient falls	Reduced by a median of 57%	9 pre-post	Low	0	0	0	0	0	+1	0	0	Moderate
	Pressure ulcers	Insufficient evidence	1 pre-post	Low	0	0	0	-1	0	0	0	0	Very low

‡ Includes two-hourly rounding and “Practice Partnership” model