

A 10-Year Review of Quality Improvement Monitoring in Pain Management: Recommendations for Standardized Outcome Measures

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■ ABSTRACT:

Quality measurement in health care is complex and in a constant state of evolution. Different approaches are necessary depending on the purpose of the measurement (e.g., accountability, research, improvement). Recent changes in health care accreditation standards are driving increased attention to measurement of the quality of pain management for improvement purposes. The purpose of this article is to determine what indicators are being used for pain quality improvement, compare results across studies, and provide specific recommendations to simplify and standardize future measurement of quality for hospital-based pain management initiatives. Pain management quality improvement monitoring experience and data from 1992 to 2001 were analyzed from 20 studies performed at eight large hospitals in the United States. Hospitals included: the University of Wisconsin Hospital and Clinics, Madison; Texas Medical Center, Houston; McAllen Medical Center, McAllen, TX; San Francisco General Hospital, San Francisco; Rush-Presbyterian-St. Luke's Medical Center and Northwestern Memorial Hospital, Chicago, IL; Memorial Sloan Kettering Cancer Center, New York; and Kaiser Sunnyside Medical Center of Kaiser Permanente Northwest, Clackamas, OR. Analyses of data led to consensus on six quality indicators for hospital-based pain manage-

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ment. These indicators include: the intensity of pain is documented with a numeric or descriptive rating scale; pain intensity is documented at frequent intervals; pain is treated by a route other than intramuscular; pain is treated with regularly administered analgesics, and when possible, a multimodal approach is used; pain is prevented and controlled to a degree that facilitates function and quality of life; and patients are adequately informed and knowledgeable about pain management. Although there are no perfect measures of quality, longitudinal data support the validity of a core set of indicators that could be used to obtain benchmark data for quality improvement in pain management in the hospital setting.

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Although many institutions in the United States have made impressive efforts to improve the quality of pain management (Dietrick-Gallagher, Polomano, & Carrick, 1994; Gordon et al., 1999; Hogan et al., 1999; Stratton, 1999; Super, 1996), numerous studies continue to document that pain care is inconsistent and inadequate (Carr, Miaskowski, Dedrick, & Williams, 1998; Cleeland et al., 1994; Wolfe et al., 2000; Zhukovsky, Gorowski, Hausdorff, Napolitano, & Lesser, 1995). A persistent roadblock to large scale national change was the voluntary nature of organizations' involvement in efforts to improve pain management. However, in January 2001, pain assessment and management became part of the survey and accreditation process for all organizations providing direct care that are accredited by the Joint Commission on Accreditation of Healthcare Organizations (Joint Commission). The introduction of evidenced-based pain standards by the Joint Commission has the potential to improve the quality of pain management in more than 19,000 of our nation's health care institutions including 98% of all hospital beds (Joint Commission, 2001).

These standards heightened the need to define quality indicators and measurement strategies for pain management. At present, limited, incomplete, and inconsistent measures of the quality of pain management may be used and the data may be misinterpreted. In fact, the use of inaccurate measures could hamper improvements in pain management. Therefore, it is important to critically evaluate the work that has been done over the past 10 years to define and measure the quality of pain management. The purposes of this article are to describe the indicators that were used to evaluate the quality of pain management, compare results across studies, and make specific recommendations to simplify and standardize outcome measures that should be used to evaluate the quality of pain management in the hospital setting.

CONCEPTUALIZATION OF QUALITY

The Institute of Medicine (IOM) defined quality health care as "the degree to which health services for indi-

viduals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Lohr, 1990, p. 21). The phrase "desired health outcomes" was further defined in 1998 by the IOM's National Round Table on Health Care Quality to mean "the health outcomes that patients' desire" (Chassin & Galvin, 1998, p. 1001). This definition highlights the importance of including consumers' satisfaction with health care and individuals' functional ability, in addition to medical outcomes of disease, in any assessment of the quality of care.

Quality theory suggests that the delivery of high-quality services increases the likelihood of positive outcomes (Blumenthal, 1996). However, poor outcomes can occur despite the best health care and, conversely, patients may do well despite the poor quality of care because of factors that cannot always be identified or measured. Thus any assessment of quality requires a multidimensional approach to measurement that includes structures, processes, and outcomes of care (Chassin & Galvin, 1998; Donabedian, 1980). Donabedian suggested that several formulations and different approaches to the management of quality are possible and legitimate, depending on the circumstance (1980). In other words, different definitions and measurement approaches are necessary for different purposes.

The design and worth of a quality measure depends on several factors including the purpose of the measure, the entity whose quality is being measured (e.g., hospital, medical group, discipline), the dimension of quality being measured, the type of measure (e.g., process, outcome), and who will use the measure (Eddy, 1998). Because professional knowledge is in a state of change, so too are the target measures of quality.

DEFINITION AND MEASUREMENT OF THE QUALITY OF PAIN MANAGEMENT

The definition and measurement of the quality of pain management for any purpose is difficult. Knowledge of

TABLE 1.

Key Measures Recommended for Monitoring the Quality of Pain Management in the Early 1990s by the AHCPR and APS Guidelines

- Patient comfort (pain intensity) [outcome]
- Impact of pain on function [outcome]
- Patient and family satisfaction with pain management [outcome]
- Documentation of pain assessment [process]
- Range and appropriateness of options available within a particular setting [structure]
- Effectiveness of pain management options used to prevent and treat pain [process and outcome]
- Prevalence and severity of side effects and complications associated with pain management [outcome]
- The quality of pain management across points of transition in the provision of services [structure and process]

Abbreviations: AHCPR, Agency for Health Care Policy and Research; APS, American Pain Society.

the relationships among the structures, processes, and outcomes of pain management are in the early stages of development and appear to be complex. A short list of factors that affect the quality of pain management include: appropriate assessment (e.g., screening for the presence of pain, completion of a comprehensive initial assessment when pain is present, frequent reassessments of patients' responses to treatment); interdisciplinary, collaborative care planning that includes patient input; appropriate treatment that is efficacious, cost conscious, culturally and developmentally appropriate, and safe; and access to specialty care as needed.

Although complementary, quality measures for accountability, quality improvement (QI), and research are also distinct (Blumenthal & Kilo, 1998). A critical point in quality measurement is that what is appropriate or useful for one purpose is not always appropriate for another. Factors that do not affect measurement for one purpose may completely invalidate the measure for a second purpose (Eddy, 1998). For example, the proportion of patients whose pain is less than 5 on a 0 to 10 numeric rating scale might be used as a measure of the quality of pain management. However, this measure might provide erroneous information about pain management because it does not measure or account for activities to prevent pain, assess pain, and ensure appropriate analgesic treatment. In addition, it does not account for activities that may have led to a reduction in a patient's pain intensity from 10 to 6. Desirable target outcomes also depend on what patients desire. An individual patient might choose a higher level of pain to limit bothersome side effects associated with analgesics.

To improve the quality of acute and cancer pain management, the American Pain Society (APS) and the Agency for Health Care Research and Quality (formerly known as the Agency for Health Care Policy and Research [AHCPR]), outlined a specific set of quality monitoring recommendations for institutions in the early 1990s (AHCPR, 1992, 1994; APS, 1991, 1995).

Although organizations were encouraged to adapt the quality measures recommended to meet their unique needs, for the first time, a standardized approach to help define and measure the quality of hospital-based pain management was available (Table 1).

The APS QI recommendations emphasize the need for interdisciplinary collaboration and clarification of responsibilities for pain management among clinicians. Also articulated as important aspects of quality are decision making that reflects input and preferences of patients and family members, contingency planning including orders to avert or treat analgesic side effects, ranges of doses to deal with varying levels of pain, and ongoing follow-up. These recommendations outline the need for a comprehensive evaluation of the quality of pain management including structure, process, and outcome measures.

Nearly 10 years have elapsed since the publication of the AHCPR and APS QI guidelines. With the release of the Joint Commission pain assessment and management standards, hospitals are being pressured to measure and report on the quality of pain management. Therefore, a synthesis and critique of data from studies that used the APS framework is necessary to affirm the validity of previously recommended measures. The remainder of this article focuses on a synthesis and critique of data from 20 QI studies in pain management that used measures from the APS guidelines. The article concludes with recommendations regarding the most appropriate and useful measures for future pain management QI studies.

SETTING AND METHODS

Settings/Participants

Seven investigators, known for their work and publications in QI, submitted data from 26 studies completed from 1992 through 2001 that measured the quality of pain management. The studies were conducted in eight hospitals in five major geographic

regions of the United States (i.e., Northwest, South, Midwest, East Coast, and West Coast).

To perform meaningful comparisons among these QI studies, studies with sample sizes of less than 70—or with outpatient and pediatric populations—and electronic drug utilization reviews were eliminated, leaving 20 studies in the final analysis (Table 2). QI data were collected on 3,527 patients. The majority of patients were on general units in acute care hospitals with medical, surgical, or cancer diagnoses. The average age of these patients was 55 years with a range from 20 to 88 years.

Quality Monitoring Methods

All of the studies were approved by the Institutional Review Boards at the study sites with the exception of three (Laferriere, 1999; 1994; 2000; personal communication, November 11, 2001) that were approved through institutional quality assurance review processes. Convenience samples of patients who had pain were recruited. Patients and records were surveyed either within 3 days of surgery or admission to hospital, or in the 3 days before discharge. The purposes of each of the studies were to gather baseline data, discover targets for improvement, or monitor changes in pain management over time as part of ongoing hospital-wide QI initiatives. Descriptive statistics and correlational analyses were generated from the study data.

SPECIFIC MEASURES

Specific measures used in patient surveys and medical record audits were derived from structure, process, and outcome criteria recommended for monitoring in the early 1990s (see Table 1). Embedded in the APS QI guideline is a survey instrument that can be used to monitor patient outcomes, along with general medical record audit recommendations to evaluate clinicians' assessments and analgesic prescribing practices. Guideline recommendations were based on a systematic review of the literature along with expert opinion. Several items in the patient survey were adapted from previously validated research tools (Daut, Cleeland, & Flanery, 1983; Ward et al., 1993; Ware, Snyder, Wright, & Davies, 1983). Measures included pain intensity, interference with function, patient satisfaction, patient beliefs, documentation of pain assessment, and the range and appropriateness of treatment.

Pain Intensity Measures

In all 20 studies, patients' self-reports of pain were measured using a widely accepted 0 to 10 (0 = no pain to 10 = worst pain imaginable) numeric rating scale. Numerous studies have documented the validity and

reliability of this measure and its significant relationship with impairment of patient function and quality of life (Rosenfeld et al., 1996; Serlin, Mendoza, Nakamura, Edwards, & Cleeland, 1995). In 90% of the studies, patients were asked to rate pain intensity at the time of survey administration (i.e., pain now) and worst and least pain, or general pain over the past 24 hours (Table 3).

From the initial studies (Bookbinder et al., 1996; Miaskowski, Nichols, Broady, & Synold, 1994; Ward & Gordon, 1994), it became evident that cross-sectional assessment of pain intensity measures did not provide an adequate evaluation of a patient's pain intensity during a particular hospitalization. For example, if patients were asked to rate their worst pain intensity in the past 24 hours on the first postoperative day, it would most likely be high. Does a single worst pain rating of 8 of a possible 10 really represent the amount of time spent in moderate to severe pain? In four studies (Gordon, Pellino, Schroeder, McConley, & Whitman, 1998; Paice, Toy, & Shott, 1998; Pellino & Gordon, 2000; Pellino, Gordon, McConley, & Bushman, 1999) a new question from the Abbott Total Quality Pain Management Program (Paice et al., 1998) was added to the survey (i.e., "How often were you in moderate to severe pain?"). Respondents were given the options of always, almost always, often, almost never, or never. Significant correlations were found between how often patients reported being in moderate to severe pain and the cross-sectional measure of worst ($r = .60, p < .001$) and least ($r = .64, p < .001$) pain, suggesting that the cross-sectional measure may in fact capture the patient's pain experience (Pellino et al., 1999).

Impact of Pain on Function

The APS patient survey (APS, 1995) included a subset of specific items from the Brief Pain Inventory (Daut et al., 1983) that evaluated how pain interferes with activities of daily living. Using a 0 (does not interfere) to 10 (completely interferes) scale, patients are asked to rate how much pain interferes with five activities (i.e., general activity, mood, ability to walk, sleep, and relationships with others).

Patient Satisfaction

Patient satisfaction was assessed using a variety of questions. The original APS survey asked three questions about satisfaction with pain treatment (see Table 3). After the publication of four studies that found little differentiation among patients' ratings of satisfaction with nurses, physicians, and results of pain treatment overall (Bookbinder et al., 1996; Miaskowski et al., 1994; Ward & Gordon, 1994, 1996), only the overall

TABLE 2.

Summary of the Findings from Studies that Evaluated the Quality of Pain Management

Study: Author and Date Published	Sample Size Population	Methods	Pain Outcome Measures					
			Pain Intensity Mean Scale 0-10	Patient Satisfaction Mean Scale 1-6	Patient Barriers Mean Scale 0-5	Impact of Pain on Function Mean Scale 0-10	Clinician Variables	
							Documentation of Pain Assessment % records w/ assess no. Ratings/24 hr	Appropriateness and Effectiveness of Options Used to Treat Pain % scheduled analgesics % with meperidine % with IM
1. Miaskowski, C., Nichols, R., Broady, R., & Synold, T., 1994	72 M/S	A/MR	4.25 N 7.56 W 3.07 L	51% very satisfied 26% somewhat satisfied	NE	NE	NE	Average 2.34 pain meds ordered per patient 16% received around the clock 55% nonopioid + opioid 21% opioid
2. Ward, S., & Gordon, D., 1994	217 M/S/C	A	3.62 N 6.62 W 1.93 L	(1-6) RN = 5.37 MD = 5.10	NE	NE	NE	NE
3. Laferriere, D., 1994	111 S	O/MR	2.8 N 6.9 W Mean pain relief = 64%	NE	NE	NE	NE	Mean maximum analgesic dose ordered/24 hour = 49 mg morphine equivalent Mean dose administered = 18 mg
4. Kweekeboom K., Ward S., Gordon, D. B., Whitman, H., & Friedrich, A., 1996	96 C	MR	NE	NE	NE	NE	47% records by RN 17% by MD 1.45 nonPCA 8.50 PCA	40% scheduled opioids 13% scheduled NSAID or combination 1.2% meperidine No IM inject
5. Bookbinder, M., Coyle, N., & Thaler, H., 1996	398 M/S/C	A	7.7 W	54% very satisfied 38% satisfied	Two most frequently identified concerns were interference from pain with sleep and normal activities	NE	55% records at baseline	NE
6. Ward, S, & Gordon, D., 1996	306 M/S/C	A	4.30 N 7.18 W 2.51 L	RN = 5.30 MD = 5.13 84% satisfied or very satisfied	NE	NE	N = 112 62% records had numeric ratings 2.07	8.9% had scheduled analgesics 32% received meperidine
7. Gordon, D. B., Ward, S., Pellino, T., & Norton, S. A., 1997	227 M/S	A	3.73 N 7.15 W 2.27 L	4.7 74% satisfied or very satisfied	Fatalism = 1.78 Addiction = 2.35 Good patient = 1.13 Side effects = 1.38 Distract MD = 1.48 Tolerance = 1.20 Progression of disease = 2.03	Activity = 5.63 Mood = 4.80 Walking = 5.42 Relationships = 3.80 Sleeping = 5.44 Cough and deep breath = 3.87	NE	NE
8. Gordon, D. B., Pellino, T., Schroeder, S., McConley, R., & Whitman, H., 1998	91 S	A/MR	7.26 W 3.01 L How often in moderate to severe pain 27% almost or almost always 37% often 33% almost never- never	NE	NE	NE	81% records had numeric rating 4.99	8% epidural 15% scheduled NSAID No meperidine 7% IM opioids
9. McNeill, J. A., Sherwood, G., Starck, P., & Thompson, C., 1998	157 M/S/C	A	4.26 N 7.73 W 5.58 general	4.77	Cannot control = 2.05 Addiction = 2.74 Avoid talk = 1.48 Side effects = 1.71 Distract = 1.42 Tolerance = 1.10 Progression = 2.41	Activity = 6.68 Mood = 5.41 Walking = 6.61 Relationships = 3.22 Sleep = 5.75 Recovery from surgery = 6.14	NE	NE
10. Paice, J. A., Toy, C., & Shott, S., 1998	200 C	Abbott survey	3.45 N 7.0 W 2.16 L How often in moderate to severe pain: 30.6% always or almost always 20.6% often 48.8% sometimes or never	7.7 (scale 0-10)	55.6% concerned about addiction 39.4% concerned about tolerance	32.8% reported interference	NE	NE

TABLE 2.
Continued

Study: Author and Date Published	Sample Size Population Methods	Pain Outcome Measures						
		Pain Intensity Mean Scale 0-10	Patient Variables			Impact of Pain on Function Mean Scale 0-10	Clinician Variables	
			Patient Satisfaction Mean Scale 1-6	Patient Barriers Mean Scale 0-5	Documentation of Pain Assessment % records w/assess Mean no. Ratings/24 hr		Appropriateness and Effectiveness of Options Used to Treat Pain % scheduled analgesics % with meperidine % with IM	
11. Chiang, S. C. 1998	88 S	O/MR	3.6 N 7.6 W 5.0 L	5.2	14% concerned about bothering nurse 16% concerned about addiction	NE	X = 4.9 for PCA X = 1.3 for non-PCA	2% epidurals 2% scheduled NSAIDs
12. Laferriere, D., 1999	109 M	O/MR	2.88N 7.47W Best relief 2.46	80% treatment choices acceptable	NE	X = 3.75 pain intensity patient could still enjoy activities	91% pain assessment documented 8% using 0-10 scale	23% scheduled analgesics 18% IM meperidine
13. Laferriere, D., 1999	156 S/C	O/MR	2.46N 6.17W Best relief 1.81	95% treatment choices acceptable	NE	X = 3.97 pain intensity patient could still enjoy activities	96% pain assessment documented 61% using 0-10 scale	28% scheduled analgesics 11% IM meperidine
14. Pellino, T. A., Gordon, D. B., McConley, R., & Bushman, S., 1999	126 surveys; 102 MR M/S	A/MR	3.74 N 7.49 W 3.09 L How often in moderate to severe pain: 36% almost always- always 33% often 31% almost never- never	4.63 MD/RN cared or prepared to manage pain most often cited for reasons for satisfaction	Fatalism = 1.69 Addiction = 2.19 Good patient = 1.04 Side effects = 1.42 Distract MD = 1.06 Tolerance = 1.11 Progression of disease = 2.09	Activity = 5.82 Mood = 4.67 Walking = 5.85 Eating = 4.89 Sleeping = 5.05 Cough and deep breath = 4.03	86% charts had numeric scale rerecorded 4.43 ratings	1% epidural 10% NSAID 2% meperidine 15% IM
15. Laferriere, C., 2000	176 M/S/C	O/MR	3.45 N 7.34 W Best relief 2.38	Pain management acceptable: 33% excellent 44% above average 21% neutral 3% below average 0% poor	NE	X = 2.66 pain intensity patient could still enjoy activities	72% pain assessment documented 80% using 0-10 scale	32% scheduled analgesics 2% IM meperidine
16. McNeil, J., Sherwood, G., Starck P. & Nieto, B., 2001	104 M/S/C	A	4.37 N 8.37 W 6.22 general	4.74	Patients indicated little agreement with all 7 barriers	Recovery = 7.12 Walking = 7.14 Activity = 6.33 Mood = 5.25 Sleep = 5.03 Relationships = 3.03	NE	66% received an analgesic within past 24 hours 35% had negative PMI scores indicating inadequate analgesic management
17. McNeill, J. A., Sherwood, G., Starck, P., & Disnard, G., 2001	263 M/S/C	A/MR	3.62 N 7.19 W 4.71 general	4.86	NE	Global interference = 6.21	NE	20% had negative PMI scores indicating inadequate analgesia
18. McNeill, J. A., Sherwood, G., & Starck, P., 2001	293 M/S/C	A/MR	3.4 N 6.9 W 4.4 general	4.9	NE	Global interference = 5.3	NE	91% received analgesics in last 24 hours 49% had negative PMI scores
19. Pellino, T. A., & Gordon, D. B., 2000	142 M/S/C	A/MR	3.59 N 7.77 W 2.83 L How often in moderate to severe pain: 40% almost always- always 31% often 29% almost never- never	4.75 Reasons for satisfaction: Not much pain 26% Med relieved pain 53% RN/MD cared 68% RN/MD prepared to manage pain 61%	Fatalism = 1.84 Addiction = 2.76 Good patient = 1.88 Side effects = 1.72 Distract MD = 1.74 Tolerance = 1.94 Disease = 2.23	Activity = 6.22 Mood = 5.53 Walking = 6.24 Sleeping = 5.46 Eating = 4.80 Cough and deep breath = 4.39	90% had recorded numeric pain ratings 5.48 ratings	10% epidural 16% nasals 3.4% meperidine 7.4% IM
20. Paice, J. A., Muir, J. C., McKay, A., & Peddinghaus, M., 2001	195 M/C	MR	NE	NE	NE	NE	Assessments were highly variable by unit 31%-70% assessed	Maximum opioid dose not associated with frequency of assessment Units with lowest opioid dose had highest use of restraints

Abbreviations: IM, intramuscularly; M, medical; S, surgical; A, American Pain Society survey; MR, medical record audit; N, pain now; W, worst pain; L, least pain; NE, not evaluated; C, cancer; RN, registered nurse; MD, physician; O, adopted patient survey; PCA, patient controlled analgesia; NSAID, nonsteroidal anti-inflammatory drug; X, mean; PMI, pain management index.

TABLE 3.
Specific Measures Used in Studies

Specific Measure (ps = patient survey, mr = medical record audit)	% Studies that Evaluated this Measure (Study Number from Table 2)	No. of Patients Evaluated
Pain Intensity ratings (ps)	18/20, 90% (1-3, 5-19)	3,236
Amount of time spent in moderate to severe pain	4/20, 20% (8, 10, 14, 19)	559
Interference with function (ps)	11/20, 55% (7, 9, 10, 12-19)	1,953
Used APS patient survey interference items	5/20, 25% (7, 9, 14, 16, 19)	756
Used global interference question	3/20, 15% (10, 17, 18)	756
Asked pain intensity with which activities could be still be enjoyed	3/20, 15% (12, 13, 15)	441
Patient satisfaction (ps)	15/20, 75% (1, 2, 5-7, 9-19)	3,034
*Circle the phrase that indicates how satisfied you are with the way your nurses treated your pain: 1 = very dissatisfied, 6 = very satisfied	4/20, 20% (1, 2, 5, 6)	993
*Circle the phrase that indicates how satisfied you are with the way your doctors treated your pain: 1 = very dissatisfied, 6 = very satisfied		
*If you were not satisfied with the way your nurses or doctors treated your pain, please explain why		
Select the phrase that indicates how satisfied or dissatisfied you are with the results of your pain treatment overall, 1 = very dissatisfied, 6 = very satisfied (Paice, Toy, & Shott, 1998 used 0-10)	11/20, 55% (7-11, 14-19)	1,867
Were the treatment choices acceptable? (yes/no)	3/20, 15% (12, 13, 15)	441
During your hospitalization, how satisfied were you with the instructions on pain management? 0 = very dissatisfied, 10 = very satisfied	2/20, 10% (17, 18)	556
Overall		
What the medication was for		
Type of pain		
The way the pain medication was given		
Timing, how often the pain medication could be given		
Use of equipment		
Comfort measures other than pain medication		
Potential side effects of pain medication		
To notify nurse of changes in your pain, such as location, intensity, or relieved pain		
Patient Beliefs (ps)	8/20, 40% (5, 7, 9-11, 14, 16, 19)	1,442
Used APS survey beliefs items	4/20, 20% (7, 9, 14, 19)	652
Used general question	4/20, 20% (5, 10, 11, 16)	790
Documentation of Assessment (mr)	11/20, 55% (4-6, 8, 11-15, 19, 20)	1,859
Range and appropriateness of treatment (mr)	15/20, 75% (1, 3, 4, 6, 8, 11-20)	2,328

* = Original APS survey items.

satisfaction question was used in later studies. In all of the 15 studies that measured patient satisfaction, patients were also asked questions about what contributed to their satisfaction or dissatisfaction (see Table 3). Several studies examined satisfaction with specific aspects of pain care including patient teaching (McNeill, Sherwood, Starck, & Disnard, 2001b; McNeill, Sherwood, & Starck, 2001c) and acceptability of treatment choices (Laferriere, 1999; 1999; 2000; personal communication, November 11, 2001).

Patient Beliefs

A subset of valid and reliable items from the Patient Barriers Questionnaire (Ward et al., 1993) that focus on reasons why patients may be reluctant to report pain or take analgesics was embedded in the APS patient survey. Patients were asked to rate on a 0 to 5 scale (0 = do not agree at all, 5 = agree very much) how much they agree with seven statements focused on common pain management misconceptions that might affect their satisfaction, including tolerance, ad-

diction, fatalism, analgesic side effects, and concerns that a report of pain would distract their physician from other treatment issues. In addition, one study tested more direct questions about patients' expectations and goals for pain relief (Ward & Gordon, 1996).

Documentation of Pain Assessments

The presence and number of pain intensity ratings (using a simple numeric or descriptive pain intensity scale) recorded in the medical record over a 24-hour period were determined through medical record audits.

Range and Appropriateness of Treatment

Descriptive data were obtained from medical record audits on the types and range of treatments prescribed and administered. In three studies (Gordon, Pellino, Schroeder, McConley, & Whitman, 1998; Kweekeboom, Ward, Gordon, Whitman, & Friedrich, 1996; Ward & Gordon, 1996), audits were done to determine adherence with several key recommendations from the AHCPR clinical practice guidelines including the percent of patients who: (1) had analgesics administered on a regular time schedule (recommended); (2) had meperidine ordered for routine pain treatment (not recommended) and, (3) had the intramuscular route used for analgesic administration (not recommended).

ANALYSIS OF THE STUDY FINDINGS

Pain Intensity

Of the 18 studies ($n = 3,236$) that reported pain intensity ratings, pain was high, with worst mean pain ratings that ranged from 6.17 to 8.37 (Figure 1). Although the patient populations in the studies varied (e.g., medical, surgical, cancer), no significant differences were noted in the intensity of the pain reported across these studies. In the four studies that examined

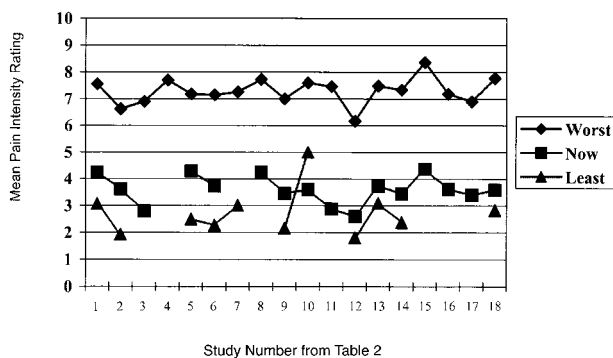


FIGURE 1. ■ Pain intensity ratings from eighteen pain management studies across time.

the amount of time spent in pain (Gordon et al., 1998; Paice et al., 1998; Pellino et al., 1999; Pellino & Gordon, 2000), approximately one-third of the patients reported being in moderate to severe pain always or almost always, one-third often, and one-third almost never or never.

Impact of Pain on Function

Fifty-five percent of the studies ($n = 2,049$ patients) evaluated patients' reports of the level of interference with function caused by pain (see Table 3). Pain produced moderate to high levels of interference with routine activities (see Table 2). The mean range of scores for each interference item was: activity (5.63 to 6.68), walking (5.42 to 7.14), sleep (5.03 to 5.75), recovery activities (3.87 to 6.14), relationships (3.03 to 3.80), and mood (4.67 to 5.41). In addition, three studies (Gordon, Ward, Pellino, & Norton, 1997; Pellino et al., 1999; Pellino & Gordon, 2000) that examined the relationships between pain intensity and functional interference found significant correlations ($r = .32$ to $.57$, $p < .001$) between all interference items and worst pain intensity ratings (Table 4).

Patient Satisfaction

Patient satisfaction was assessed in 75% of the studies (see Table 3). In all of these studies, ratings of patient satisfaction with pain management were consistently high (see Table 2). In nine studies (see Table 4), small but significant negative correlations (range $-.17$, $p < .05$ to $-.47$, $p < .001$) were found between pain intensity ratings and ratings of patient satisfaction with pain management. The most often cited reason for patient satisfaction with pain management in two studies (Pellino et al., 1999; Pellino & Gordon, 2000) was whether the doctors and nurses were perceived to care about the patients' pain. Positive correlations were found in other studies (Bookbinder et al., 1996; McNeill, Sherwood, Starck, & Thompson, 1998; Miaskowski et al., 1994) between dissatisfaction and lack of staff response to complaints of pain. One study (McNeill, Sherwood, Starck, & Nieto, 2001a), used backward logistic regression analysis to demonstrate that patient satisfaction was predicted by general pain in the past 24 hours (odds ratio [OR] = 4.0) and pain's interference on mood (OR = 7.3). In another study (McNeill et al., 2001b), patient satisfaction was predicted by patient satisfaction with nursing care (OR = 3.3) and with instructions about pain management (OR = 2.5).

One study (Ward & Gordon, 1994) asked patients to rate the level of pain relief they felt should have been *possible* to receive and the level of pain relief they *wanted* to receive. Although the level of pain

expected or wanted was similar to patients' least pain, there were no relationships between expected or wanted pain levels and satisfaction. In fact, when differences between what was expected or wanted and what was achieved were examined, even those who did not get what they expected or wanted were satisfied with pain management.

Patient Beliefs

Eight studies (40%) evaluated 1,442 patients' beliefs about pain and pain management. Consistent with

original research of patient beliefs (Ward et al., 1993) (in which patients rated on a scale of 0 to 5 the extent to which they agreed with a concern reflective of a barrier to pain management), patients in these QI studies reported some level of agreement (mean = 1.10 to 2.74) with all seven barriers statements (Figure 2). Patient beliefs did not vary significantly by satisfaction nor consistently by age (McNeill et al., 1998; McNeill et al., 2001a; Pellino et al., 1999; Pellino & Gordon, 2000). Differences were found in one study (Paice et al., 1998) between ethnic groups, with His-

TABLE 4.

Correlation Coefficients Between Pain Intensity Ratings, Interference With Activity, and Satisfaction

Study	Correlations between Worst Pain Intensity and Interference with Function	Correlations between Measures of Pain Intensity and Satisfaction with Pain Management
Miaskowski, C. et al., 1994	NE	Pain now $r = -.47, p < .001$ Worst pain $r = -.33, p < .001$
Gordon, D. B. et al., 1997	Activity $r = .55, p < .001$ Mood $r = .54, p < .001$ Walking $r = .54, p < .001$ Relationships $r = .51, p < .001$ Sleeping $r = .51, p < .001$ Cough and deep breathing $r = .32, p < .001$	Pain now $r = -.17, p < .05$ Worst pain $r = -.22, p < .01$ Least pain $r = -.23, p < .01$
Adams-McNeill, J. A., 1998	NE	Pain now $r = -.25, p < .008$ Usual pain $r = -.28, p < .002$
Paice J. A. 1998	NE	Pain now $r = -.57, p < .00005$
Pellino, T et al., 1999	Activity $r = .57, p < .001$ Mood $r = .47, p < .001$ Walking $r = .43, p < .001$ Eating $r = .42, p < .001$ Sleeping $r = .52, p < .001$ Cough and deep breathing $r = .37, p < .001$	Pain now $r = -.23, p < .05$ Worst pain $r = -.25, p < .01$ Least pain $r = -.12, NS$
McNeill, J. A., Sherwood, G., Starak, P., Nieto, B., 2001	NE	Pain now $r = -.49, p = .001$ General pain $r = -.30, p = .003$
McNeill, J. A., Sherwood, G., Starck, P., & Disnard, G., 2001	NE	Pain now $r = -.20, p < .01$ General pain $r = -.30, p < .01$ Worst pain $r = -.23, p < .01$
McNeill, J. A., Sherwood, G., & Starck, P., 2001	NE	Pain now $r = -.29, p < .01$ General pain $r = -.32, p < .01$ Worst pain $r = -.24, p < .01$
Pellino T., & Gordon, D. B., 2000	Activity $r = .54, p < .001$ Mood $r = .40, p < .001$ Walking $r = .47, p < .001$ Eating $r = .32, p < .001$ Sleeping $r = .43, p < .001$ Cough and deep breathing $r = .35, p < .001$	Pain now $r = -.26, p < .01$ Worst pain $r = -.20, p < .05$ Least pain $r = -.15, NS$

Abbreviations: NE, not examined; NS, not significant.

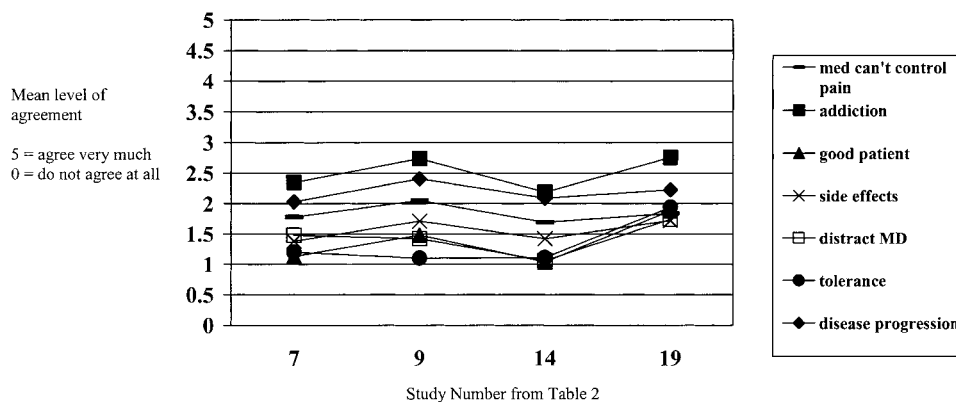


FIGURE 2. ■ Patient beliefs: Mean level of agreement with barriers items from four Q1 studies that used the APS barriers items.

panics more likely to be concerned about tolerance than African-Americans and Caucasians. In the same study, patients who had the highest worst pain ratings were more likely to be concerned about addiction. Barrier statements with the highest level of agreement (indicating a barrier to pain management) across all four studies were fear of addiction and the belief that pain was a sign of disease progression (see Figure 2).

Documentation of Pain Assessments

Rates of documentation of pain assessments were evaluated in 55% of the studies (*n* = 1,850 patients), and ranged from 47% to 96% (see Table 3). Changes in rates of documentation based on the year of study publication were evaluated. Documentation of both the presence of pain, and the number of documented pain intensity ratings over a 24-hour monitoring period, increased over time (Figure 3).

Range and Appropriateness of Treatment

Seventy-five percent of the studies examined analgesic prescriptions and administration through chart audits

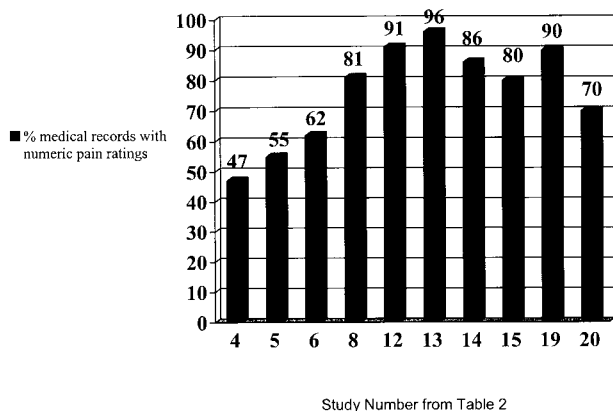


FIGURE 3. ■ Percentage of medical records with documentation of pair intensity from ten Q1 studies across time.

(see Table 3). The dominant pattern of analgesic prescriptions found in all of these studies was as needed (i.e., prn) orders for analgesics. Eight studies (see Table 2) reported on the use of meperidine and intramuscular injections. The prevalence of meperidine use and intramuscular (IM) injections was higher in earlier studies compared to those in the later years. In one study that specifically examined the efficacy of these interventions (Gordon et al., 1998), patients who received prn IM injections reported higher worst (*M* = 8.1) and least pain (*M* = 4.5) intensity ratings, and reported being in moderate to severe pain almost always or always (43%), more often than any other regimen. Studies that examined the makeup of individual patient’s analgesic regimens (Chiang, 1998; Gordon et al., 1998; Kweekeboom et al., 1996; Pellino et al., 1999; Pellino & Gordon, 2000) found that the majority of patients received a single analgesic agent—that is, an opioid or nonopioid alone—as opposed to multimodal combination therapy. Documentation of the use of nonpharmacologic interventions (Gordon et al., 1998; Pellino et al., 1999) was significantly less than that reported by patients (Gordon et al., 1998; Pellino et al., 1999; Pellino & Gordon, 2000).

DISCUSSION

Over 10 years (1992-2001), 20 studies have used various iterations of the APS QI guidelines to evaluate the quality of pain management in an inpatient setting. To date, 3,527 patients with medical, surgical, and cancer diagnoses were evaluated. Several trends regarding the various pain outcome measures used are worth noting and provide direction for future studies in this area.

Pain Intensity

Of note, pain intensity ratings reported by patients remain high over the 10 years of data collection. This

finding is troublesome, particularly when data from studies that were done over time at the same institutions failed to show significant decreases in pain intensity, despite extensive QI efforts. Several alternative hypotheses may explain these disappointing results. First, numeric rating scales (NRS) of pain intensity may not be sensitive enough to detect changes in pain intensity following QI interventions. This explanation is not entirely plausible because NRSs are well-validated and reliable measures of pain intensity (Rosenfeld et al., 1996; Serlin et al., 1995) that can detect significant changes in pain intensity after both pharmacologic (Benedetti et al., 1998; Edwards et al., 1999; Gottschalk et al., 1998) and nonpharmacologic interventions (DeWit et al., 1997; Hochberg, 2001; Steen, Cooper, Marchant, Griffiths-Jones, & Walker, 2000).

A far more plausible explanation for the failure to see decreases in pain intensity ratings over time is that the treatment of pain in the hospital settings remains inadequate and ineffective. This hypothesis is supported by findings from several of these QI studies that showed that 20% to 49% of patients had inappropriate prescriptions (i.e., negative pain management index (PMI) scores) (McNeill et al., 2001a, 2001b, 2001c) and that only a small percentage of patients received analgesics on a regular schedule (Chiang, 1998; Gordon et al., 1998; Kweekeboom et al., 1996; Laferriere, 1999, 2000; Miaskowski et al., 1994; Ward & Gordon, 1996). Based on the large number of pharmacologic (AHCPR, 1992, 1994; Benedetti et al., 1998; Edwards et al., 1999; Gottschalk et al., 1998) and nonpharmacologic (AHCPR, 1992, 1994; DeWit et al., 1997; Hochberg et al., 2001; Steen et al., 2000) studies that used NRS of pain intensity to evaluate the effectiveness of pain management interventions, these scales should continue to be used in QI studies of pain management. Future studies should evaluate differences in pain intensity ratings based on the effectiveness and appropriateness of the various pain treatment options.

Impact of Pain on Function

Twelve studies (Gordon et al., 1997; Laferriere, 1999; 1999; 2000; personal communication, November 11, 2001); McNeill et al., 1998, 2001a, 2001b, 2001c; Paice et al., 1998; Pellino et al., 1999; Pellino & Gordon, 2000) evaluated the impact of pain on function and found relatively consistent findings. As with pain intensity, the interference ratings remained the same over the 10 years of data collection. Of note, higher pain intensity ratings were associated with higher levels of functional interference. In addition, the higher pain intensity ratings associated with physical function compared with psychosocial function (see Table 4) may be indicative of the population of patients who were surveyed in the hospital

setting. Although less is known about the ability of pharmacologic and nonpharmacologic interventions to reduce pain interference ratings, these items should be monitored as part of QI studies because function is highlighted as a critical component of the IOM definition of quality. The number of interference items that are evaluated should be tailored to the patient population and the importance of these activities to patient recovery and adaptation.

Patient Satisfaction

As described earlier, consumer satisfaction is also a critical element of the IOM's definition of quality and it is a commonly used quality indicator. Patient satisfaction is based on patient expectations, beliefs, values, and sense of entitlement (Di Palo, 1997). Although an appealing outcome indicator, the measurement of satisfaction is notoriously complex; responses are almost always skewed toward the positive and the results are often difficult to interpret. The evaluation of patient satisfaction has been particularly problematic in QI studies of pain management. One of the most paradoxical, yet consistent findings, is the fact that despite high pain intensity ratings, the majority of patients surveyed in the 15 studies that reported patient satisfaction provided extremely high satisfaction ratings.

In addition, one study that queried patients about goals and expectations for pain relief in an attempt to better understand this paradox (Ward & Gordon, 1996) found many patients reported difficulty answering the questions. This finding raises questions about whether patients are knowledgeable enough about pain management options to evaluate its quality. Because patient input into decision making is a critical component of quality pain management, questions about adequacy of information provided about pain and pain control options may provide a better measure to evaluate the quality of pain management. Therefore rather than having patients rate their level of satisfaction with pain management one needs to evaluate whether clinicians involved patients in pain management and discussed options for pain control with them.

Patient Beliefs

The reason that a set of validated items from the Barriers Questionnaire (Ward et al., 1993) was included in the APS patient survey was to determine whether beliefs affected satisfaction. However, in the studies that included these items (Bookbinder et al., 1996; Chiang, 1998; Gordon et al., 1997; McNeill et al., 1998, 2001a; Paice et al., 1998; Pellino et al., 1999; Pellino & Gordon, 2000) beliefs about pain management did not significantly differ between satisfied and unsatisfied patients. Therefore we recommend that

the routine measurement of patient beliefs be eliminated as a quality indicator. An examination of patient beliefs about pain and pain management may be more useful in clinical practice to identify concerns about taking analgesics, and to help clinicians develop a proactive and individualized approach to patient and family education about pain management.

Documentation of Pain Assessments

Regular reassessment of pain and communication of that assessment in the medical record is an important component of quality pain management. However, determining the necessary components (e.g., location, quality, intensity) of an initial pain assessment and the frequency of reassessments is difficult in part because of the context in which the pain occurs. The frequency with which postoperative pain is assessed should be frequent initially, and then may decrease over time, whereas a patient with progressive cancer pain who is admitted to the hospital for changes in analgesic management would require more frequent assessments over time.

Studies reported in this article demonstrated an increased frequency of assessments over time. What is disappointing is that these ratings are not decreasing in intensity, they just appear to be documented more frequently. Future studies of the quality of pain management should evaluate the frequency with which pain assessments are documented within a specific period of time and for specific patient populations. The rate of documentation should be compared to some pre-established standard for assessment to determine an adherence rate with documentation of pain assessments. For example, if the pre-established standard for the first 48 hours postoperatively is a pain assessment every 4 hours, then a total of 12 assessments should be documented in a patient's record. If only six assessments were documented in 48 hours, the adherence rate would be 50%. Perhaps more importantly, as institutions conduct longitudinal studies, not only should adherence rates increase, but the increased visibility of persistent high pain intensity ratings should direct attention to better pain treatment with associated decreases in pain intensity.

Range and Appropriateness of Treatment

An evaluation of the range and appropriateness of pain treatment is extremely complex because of the inter-individual variability in patient needs and responses to treatment. Perhaps two of the simplest indicators that can be used to evaluate the appropriateness of pain treatment are the use of IM injections and the administration of meperidine. Both of these practices are *not* recommended by numerous clinical practice guidelines

(ACHPR, 1992, 1994; American Geriatric Society, 1998; APS, 1999; American Society of Anesthesiologists, 1995).

A novel method for evaluating the range and appropriateness of pain treatments is the use of the PMI (Cleeland et al., 1994). The PMI is a score computed by subtracting a patient's worst pain intensity rating from the rating of the most potent analgesic prescribed or administered to a patient. Worst pain intensity ratings and analgesics are separately collapsed into three categories each. The final adequacy of pain management is measured on a scale that ranges from -3 to $+3$, with negative scores representing poor pain management. Negative PMI scores were reported in one study (McNeill et al., 2001a) for one-third to one-half of the patients surveyed. Although the PMI was designed to evaluate the appropriateness of cancer pain management, further investigations are warranted to determine its usefulness in evaluating the range and appropriateness of pain treatments for hospitalized patients.

New measures that can evaluate the quality of multimodal pain treatment regimens need to be developed and tested. There is growing evidence that postoperative pain in the hospital setting is best managed using a combination of methods including regional anesthetic techniques (e.g. nerve blocks, local wound infiltration, and epidural catheters to deliver local anesthetics, opioids), along with the systemic administration of non-steroidal anti-inflammatory drugs and opioids and nonpharmacologic techniques (Jin & Chung, 2001; Kehlet, 1997).

AREAS FOR FUTURE EVALUATION

This review and our recommendations point out the need for specific types of evaluations. Several of the quality measures that were evaluated (and are now recommended) are inadequate for patients most at risk for under treatment, that is, patients who are nonverbal or cognitively impaired because these measures rely on self-report. In addition, cultural differences in the pain experience and the optimal methods to assess the quality of pain management with different ethnic groups have not been studied extensively. These groups may be at greatest risk for poor pain management as research has demonstrated undertreatment of pain in minority ethnic groups (Ng, Dimsdale, Shragg, & Deutsch, 1996; Todd, Samaroo, & Hoffman, 1993).

Another area worth noting is the absence of data regarding a number of the indicators that were suggested by the APS QI guidelines (i.e., prevalence and severity of side effects, complications associated with pain management, and quality of care across points of transition of services). These areas need to be mea-

TABLE 5.

New Recommended Quality Indicators and Suggested Measures for Pain Management

Quality Indicator	Measure (Tool)
Process (assessment and treatment) The intensity of pain is documented with a numeric (e.g., 0-10, 0-5) or descriptive (e.g., mild-moderate-severe) rating scale.	Is there any documentation of pain? ___ yes ___ no
Pain intensity is documented at frequent intervals.	In the charts where there is some documentation of pain, did the documentation include the use of either a numeric (e.g., 0-10, 0-5) or descriptive (e.g., mild-moderate-severe) pain intensity scale? ___ yes ___ no How many pain intensity ratings (either numeric or descriptive) were recorded during this (24-hour) period by the RNs? ___
Pain is treated by a route other than intramuscular (IM).	Percent of patients receiving intramuscular injections.
Pain is treated with regularly administered analgesics and when possible a multimodal approach is used (e.g., combinations of regional or local techniques with non-opioid, opioid, adjuvant analgesics, and nonpharmacologic methods).	Percent of patients receiving nonopioid alone, opioid alone, regional techniques (e.g., neuraxial) and various combinations of nonopioid, opioid, and regional techniques.
Outcomes Pain is prevented and controlled to a degree that facilitates function and quality of life.	Percent of patients receiving meperidine. (patient question) Did you use any non-drug interventions in addition to analgesics to manage your pain? ___ yes ___ no If yes, please check all that apply: relaxation, meditation, heat, cold, deep breathing, walking, imagery or visualization, other (please describe)
Patients are adequately informed and knowledgeable about pain management.	On this scale (0-10), please indicate the worst pain you had in the first 24 hours? On this scale (0-10), please indicate the least pain you had in the first 24 hours? How often were you in moderate to severe pain in the first 24 hours? ___ always ___ almost always ___ often ___ almost never ___ never Circle the number that best described how, during the first 24 hours, pain interfered with your: activity, mood, sleep (may add other items for specific populations) 0 = does not interfere, 10 = completely interferes Adequacy of information you received about pain and pain control options while in hospital: 1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent

sured to determine if they are valid indicators to use in an evaluation of pain management.

One of the major issues that needs to be considered is that these studies evaluated the quality of pain management during a very limited period. Studies need to be done that evaluate the quality of pain management during an entire episode of care, or across specific points of transition in care.

CONCLUSIONS

As our knowledge of pain management has grown, so too has the complexity of quality measurement

tools. A comprehensive evaluation of the quality of pain management involves measurement of *both* practice patterns and patient outcomes. Although the use of the APS patient survey combined with a comprehensive pain management medical record audit tool represents more than 100 distinct data points, more avenues must be investigated, such as acts of omission and the identification of safety errors in pain management (Starck, Sherwood, Adams-McNeill, & Thomas, 2001). As in most areas of health care, the difficulty with measurement and the complexity of interpreting relationships among data

remain overwhelming. In light of the new Joint Commission pain standards, hospitals must stay focused on the purpose of QI monitoring to better understand the processes involved in pain management and determine targets for improvements. The studies evaluated in this review suggest a core set of quality indicators that may be appropriate and practical as a set of standardized measures for future comparisons (Table 5). At the same time, the direct measurement of patient satisfaction, patient beliefs

about pain, and extensive audits of analgesic treatment are not recommended.

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