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INSTITUTE FOR CLINICAL SYSTEMS IMPROVEMENT

Health Care Guideline:
Assessment and Management of Acute Pain

Sixth Edition
March 2008

The information contained in this ICSI Health Care Guideline is intended primarily for health professionals and the following expert audiences:

- physicians, nurses, and other health care professional and provider organizations;
- health plans, health systems, health care organizations, hospitals and integrated health care delivery systems;
- health care teaching institutions;
- health care information technology departments;
- medical specialty and professional societies;
- researchers;
- federal, state and local government health care policy makers and specialists; and
- employee benefit managers.

This ICSI Health Care Guideline should not be construed as medical advice or medical opinion related to any specific facts or circumstances. If you are not one of the expert audiences listed above you are urged to consult a health care professional regarding your own situation and any specific medical questions you may have. In addition, you should seek assistance from a health care professional in interpreting this ICSI Health Care Guideline and applying it in your individual case.

This ICSI Health Care Guideline is designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and is not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition. An ICSI Health Care Guideline rarely will establish the only approach to a problem.

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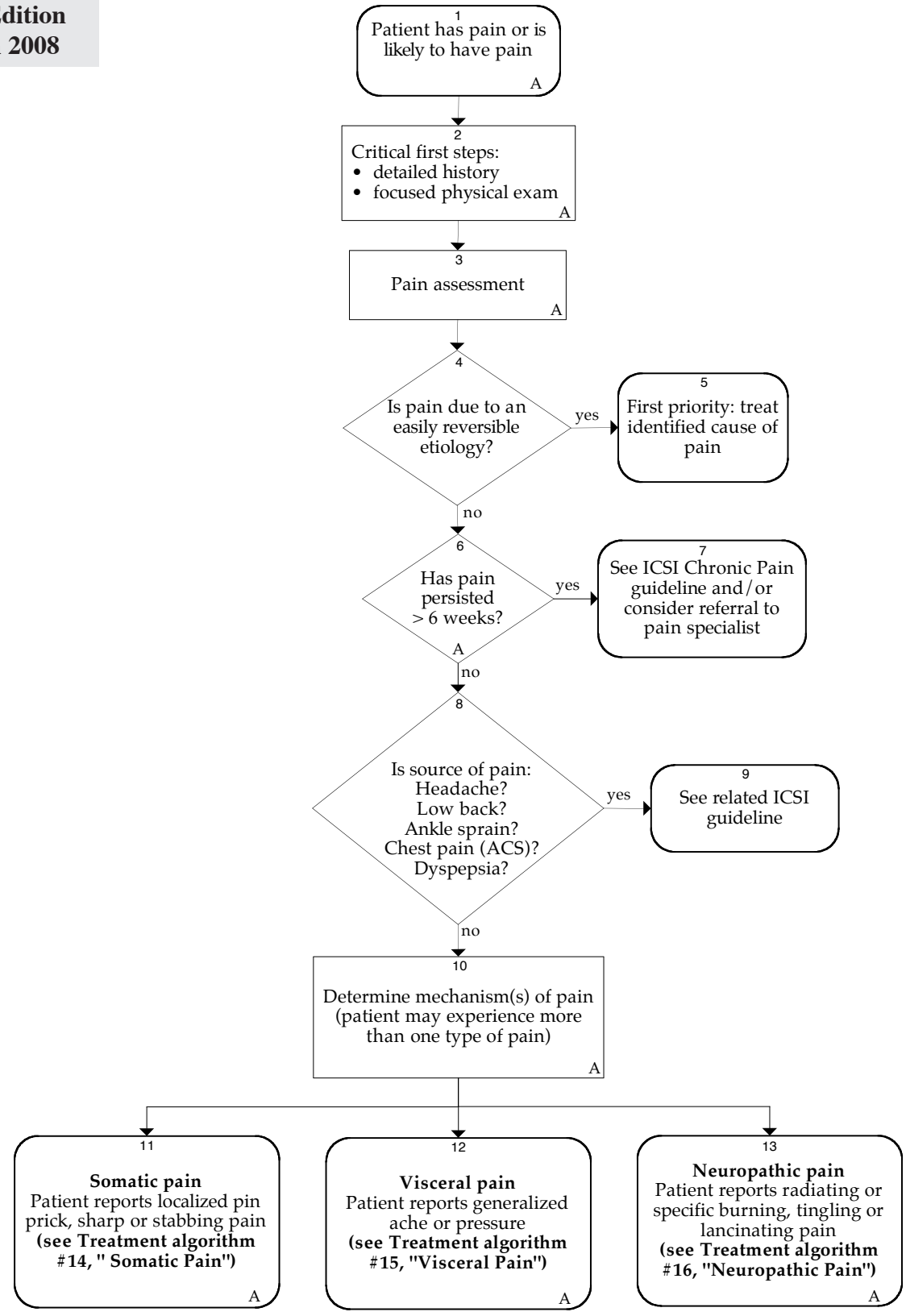
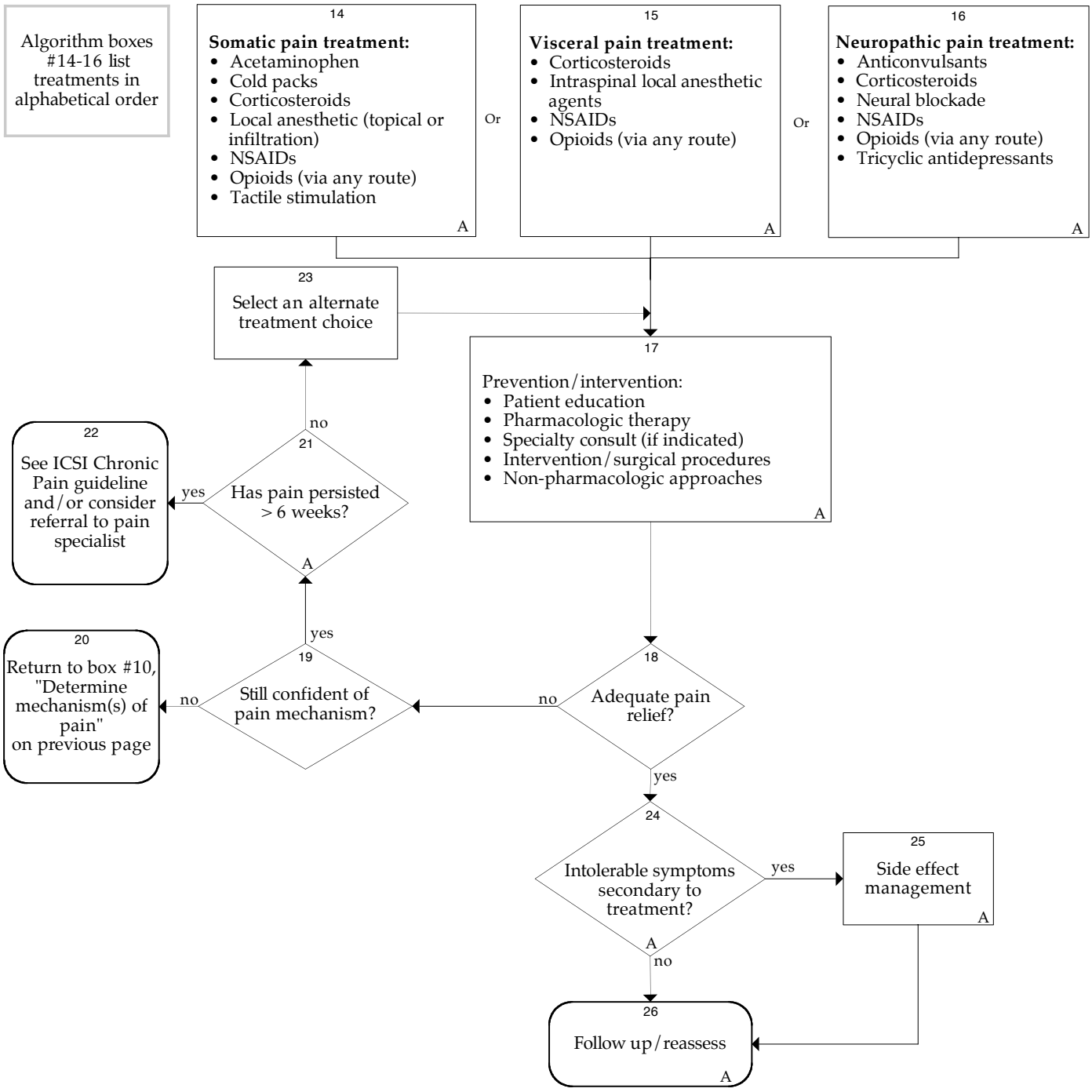
Assessment Algorithm

A = Annotation



Treatment Algorithm



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Foreword

Scope and Target Population

This guideline has been developed for patients of all ages (from infant to very elderly) who have acute pain or may be experiencing acute pain in the future (i.e., planned surgery). This guideline excludes patients with acute cancer pain, labor pain and migraine headache, although many of the guideline's recommendations apply to those groups, as well.

Rather than focus on the cause of the pain (a comprehensive list would fill a textbook) or the setting where the pain is treated (inpatient or outpatient), this guideline focuses on effective treatment based on the physiologic mechanisms of pain transmission (e.g., somatic, visceral, neuropathic). Understanding this should allow clinicians to apply this algorithm to almost any kind of acute pain (no matter what the cause) and in any setting.

We acknowledge that assessments of pain in the preverbal, non-English-speaking and cognitively impaired are challenging. As a result, relevant recommendations will be made in order to enhance assessment of an intervention for all patients. The following definitions are assumed:

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.

Acute pain states can be brief, lasting moments or hours, or they can be persistent, lasting weeks or several months until the disease or injury heals *(Bonica, 1990 [R])*.

Chronic pain is defined as persistent pain, which can be either continuous or recurrent and of sufficient duration and intensity to adversely affect a patient's well-being, level of function, and quality of life *(Wisconsin Medical Society, 2004 [R])*. If a patient's pain has persisted for six weeks (or longer than the anticipated healing time), a thorough evaluation for the cause of the chronic pain is warranted.

Clinical Highlights and Recommendations

- Intensity of pain is assessed prior to initiation of appropriate treatment and continually reassessed throughout duration of treatment. *(Annotation #3)*
- Determine the mechanism of pain (i.e., somatic, visceral, neuropathic) based on the physical examination and detailed history. *(Annotation #10)*
- Patients often experience more than one type of pain. *(Annotation #10)*
- Somatic pain is well localized and may be responsive to acetaminophen, cold packs, corticosteroids, localized anesthetic (topical or infiltrate), NSAIDs, opioids and tactile stimulation. *(Annotations #11, 14)*
- Visceral pain is more generalized and is most responsive to opioid treatment. *(Annotations #12, 15)*
- Neuropathic pain may be resistant to opioid therapy and consideration should be given to adjuvant therapy such as tricyclic antidepressants and anticonvulsants. *(Annotations #13, 16)*
- While the emphasis of this guideline is on pharmacologic therapy, multimodal treatment approaches are important to consider because patient satisfaction is high when non-pharmacologic approaches are provided. (*Annotation #17)*

Priority Aims

1. Improve the assessment and reassessment of all age patients with acute pain by determining the mechanism and intensity of pain.
2. Improve the treatment of patients (all ages) with acute pain, to include appropriate selection of pharmacologic and/or non-pharmacologic interventions. *(Annotation #17)*
3. Increase the involvement of patients with acute pain of all ages, or their caregiver, in the management of their pain symptoms.

Key Implementation Recommendations

The following system changes were identified by the guideline work group as key strategies for health care systems to incorporate in support of the implementation of this guideline.

1. All patients presenting with a complaint of acute pain are assessed for origin of pain through physical examination and detailed history.
2. An individualized care plan is developed for each patient to ensure adequate pain control while monitoring for signs of psychological and/or physical dependence.
3. Establish a protocol specific for PCA pump monitoring (see Annotation #17).

Related ICSI Scientific Documents

Related Guidelines

- Assessment and Management of Chronic Pain
- Adult Low Back Pain
- Ankle Sprain
- Diagnosis of Chest Pain and Acute Coronary Syndrome
- Dyspepsia and GERD
- Diagnosis and Treatment of Headache
- Diagnosis and Treatment of Adult Degenerative Joint Disease (DJD) of the Knee

Patient and Family Guidelines

- Adult Low Back Pain
- Diagnosis and Treatment of Headache

Disclosure of Potential Conflict of Interest

ICSI has adopted a policy of transparency, disclosing potential conflict and competing interests of all individuals that participate in the development, revision and approval of ICSI documents (guidelines, order sets and protocols). This applies to all work groups (guidelines, order sets and protocols) and committees (Committee on Evidence-Based Practice, Cardiovascular Steering Committee, Women's Health Steering Committee, Preventive & Health Maintenance Steering Committee, Respiratory Steering Committee and the Patient Safety & Reliability Steering Committee).

Participants must disclose any potential conflict and competing interests they or their dependents (spouse, dependent children, or others claimed as dependents) may have with any organization with commercial, proprietary, or political interests relevant to the topics covered by ICSI documents. Such disclosures will be shared with all individuals who prepare, review and approve ICSI documents.

No work group members have potential conflicts of interest to disclose.

Introduction to ICSI Document Development

This document was developed and/or revised by a multidisciplinary work group utilizing a defined process for literature search and review, document development and revision as well as obtaining and responding to ICSI members.

For a description of ICSI's development and revision process, please see the Development and Revision Process for Guidelines, Order Sets and Protocols at http://www.icsi.org.

Evidence Grading System

A. Primary Reports of New Data Collection:

Class A: Randomized, controlled trial

Class B: Cohort study

Class C: Non-randomized trial with concurrent or historical controls
Case-control study
Study of sensitivity and specificity of a diagnostic test
Population-based descriptive study

Class D: Cross-sectional study
Case series
Case report

B. Reports that Synthesize or Reflect upon Collections of Primary Reports:

Class M: Meta-analysis
Systematic review
Decision analysis
Cost-effectiveness analysis

Class R: Consensus statement
Consensus report
Narrative review

Class X: Medical opinion

Citations are listed in the guideline utilizing the format of *(Author, YYYY [report class])*. A full explanation of ICSI's Evidence Grading System can be found at http://www.icsi.org.

Definitions of Terms Used in This Guideline:

†*Addiction*: Addiction is a primary, chronic, neurobiologic disease, with genetic, psychosocial and environmental factors influencing its development and manisfestations. It is characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving.

**Analgesic Tolerance*: Analgesic tolerance is the need to increase the dose of opioid to achieve the same level of analgesia. Analgesic tolerance may or may not be evidenced during opioid treatment and does not equate with addiction.

DPNB: Dorsal Penile Nerve Block.

EMLA: Eutectic Mixture of Local Anesthetics.

LET: Anesthetic solution comprised of Lidocaine, Epinephrine and Tetracaine.

Neuropathic: A pathological change in the peripheral nervous system.

NMDA: N-methyl-D-aspartate

Nociception: The process of detection and signaling the presence of a noxious stimulus.

Opioid-Induced Hyperalgesia: Opioids may lead to a paradoxical increase in pain despite receiving increasing doses of opioids.

**Pain*: An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.

PCA: Patient controlled analgesia, a method in which the patient self-administers analgesics, according to the clinician's order, to control his/her own pain.

†*Physical Dependence*: Physicial dependence is a state of adaptation that is manisfested by a drug class specific withdrawal syndrome that can be produced by abrupt cessation, rapid dose reduction, decreasing blood level of the drug, and/or administration of an antagonist.

**Pseudoaddiction*: Pattern of drug-seeking behavior of pain patients who are receiving inadequate pain management that can be mistaken for addiction.

Radicular: Pertaining to a nerve root.

Somatic: Pertaining to the body wall in contrast to the viscera.

**Substance Abuse*: Substance abuse is the use of any substance(s) for non-therapeutic purposes, or use of medication for purposes other than those for whom it is prescribed.

TAC: Anesthetic solution comprised of tetracaine, adrenaline (epinephrine) and cocaine.

† *Tolerance*: Tolerance is a state of adaptation in which exposure to a drug induces changes that result in a diminution of one or more of the drug's effects over time.

Visceral: Pertaining to a bodily organ.

* From "Model Guidelines for the Use of Controlled Substances for the Treatment of Pain" (5/98), Federation of State Medical Boards of the United States.

† From "Definitions Related to the Use of Opioids for the Treatment of Pain." 2001. American Academy of Pain Medicine, American Pain Society, and the American Society of Addiction Medicine.

Algorithm Annotations

Assessment Algorithm Annotations

1. Patient Has Pain or Is Likely to Have Pain

Pain is undertreated by many practitioners, which leads to serious clinical consequences (*Bandolier Extra, 2003 [R]).* This guideline encourages aggressive assessment, treatment and reassessment of pain.

There are many statements in the medical literature decrying the inadequate treatment of pain. Reasons for undertreatment of pain range from educational, cultural, social and legal to moral and financial *(Lawrence, 2005 [R]).* The benefits of properly treating or preventing pain are numerous and include reduced hospital stays, quicker return to work, decreased disability, and decreased postoperative complications like atelectasis, pneumonia, DVT and suppression of the immune system (*Bandolier Extra, 2003 [R]).* Also included in the benefits of treating pain are the prevention of "pain memories" *(Desbiens, 1997 [B]; Schug, 1995 [D]).* This is manifested by studies demonstrating that boys given adequate circumcision analgesia have a decreased pain response to infant immunizations compared to boys without adequate circumcision pain control *(Taddio, 1997b [A]).* Likewise, it has been shown that adults given adequate acute pain control have a reduced tendency to develop chronic pain syndromes. There are also reports that when given certain types of anesthesia and analgesia, some patients undergoing amputations may be less likely to develop "phantom limb pain" *(Schug, 1995 [D]).*

2. Critical First Steps

Key Points:

- The patient and/or caregiver play a critical role in the assessment and management of pain.
- Assessing the type and amount of pain is important to good pain control. This is done by describing and rating the pain. Educate the patient and/or caregiver in the selection and use of an appropriate pain scale.
- Parents can help assess pain in children by what their child says, what their child is doing, and how their child's body is reacting.
- Pain medications should not be withheld during initial evaluation for potential surgical abdomen.

Acute pain is not a diagnosis, it is a symptom. Frequently its cause is obvious, such as after surgery or an acute trauma. Many times, however, the exact underlying etiology is not clear and a diagnostic workup is necessary. An interview with the patient or a responsible caregiver is essential to determine etiology. The interview and examination should cover the following:

General History

- History of present illness (HPI)
- Current medications
- Medication allergies

- Past medical history
- Social history

Pain history

- Onset
- Duration
- Quality, character
- Ameliorating and provoking factors
- Patient rating if possible (see Annotation #3, "Pain Assessment")

Clinical exam

- Observation of response to pain (preverbal or cognitively impaired patients): e.g., rubbing a particular area, guarding, facial expression.
- Focused physical exam (part of body or region in pain), to include vital signs. Increases in pulse, respiratory rate, and blood pressure are often but not always noted in the presence of acute pain. However, vital signs may be normal as a result of physiologic adaptation.
- Functional assessment (see Annotation #3, "Pain Assessment"). See the Support for Implementation section, "Resources Available," for examples of assessment tools.
- Pain medications should not be withheld during initial evaluation for potential surgical abdomen *(Chong, 2004 [C])*.

Observer/Caregiver Ratings of Pain and Pain Relief

Often in clinical situations, the health care team is confronted with patients who are cognitively impaired, heavily medicated, ventilated, or non-English speaking. At these times it is necessary to form clinical judgments regarding the patient's potential level of discomfort. Observer or caregiver ratings of pain and of the relief of pain with medical therapy are efficient in these clinical settings.

There are many other behaviors that can be observed when someone is experiencing pain. Humans are able to control behavior to a degree, which will individually depend on conditioning, personality, past experience and present circumstances. Moreover, pain-related behavior may change with time for the patient. For instance, Lim and Guzman reported that when pain was inflicted on volunteers, 81% reported feeling pain, 52% displayed facial features of pain and only 31% continued the same patterns of pain behavior with repeated stimuli *(Lim, 1968 [R])*.

Facial expressions have historically been viewed as especially reliable indicators of the intensity of pain *(Craig, 1992 [R])*. In a very laborious process of observing patients experiencing various types of pain, Prkachin has determined a few facial movements that are consistently related to different types of pain *(Prkachin, 1992 [C])*. The four actions that comprise the basic pain signal are brow lowering, orbit tightening, levator contraction, and eyelid closing. Other clinical indicators are a result of an adrenergic response to severe and acute pain. Tachycardia, hypertension, diaphoresis, restlessness and other signs will dissipate with duration of pain and as a result are less reliable over time.

Caution should be used in this type of pain since only the sufferer knows severity of pain. A caregiver's assessment of a patient's current level of pain can be influenced by stereotypes, interactions with the patient, other patients, and other interactions on the health care team *(Werner, 1998 [D])*. Nurses and physicians have been reported to underestimate patients' pain levels. For those who are cognitively impaired, prevalent rates of pain have been found to be lower than those of same age who can relay information about pain

themselves. A conscious awareness of potential bias will allow for clinical data gathering; however, this should never be the means of collecting scientific data.

Further diagnostic work-up

Lab studies, x-rays or other diagnostic tests may be needed, depending on the results of the history and physical examination.

Specialty consult

General surgical, orthopedic, anesthesiological or other consultation may be deemed necessary.

3. Pain Assessment

Key Points:

- The patient self-report is the most reliable indicator of pain.
- The ideal pain assessment tool will facilitate identification of the presence of pain and will be valid for use over time.
- The patient or caretaker should be taught how to use the pain scale.
- In children and the elderly, pain measures may be influenced by limited cognitive or language skills, or by the positive or negative consequences their pain reports or behavior produce.

Based on the assumption that patient self-reporting is the "most reliable indicator of the existence and intensity of pain" (National Institutes of Health), the ideal tool for pain will identify the presence of pain and its evolution over time. In addition, tools should be applicable to any person regardless of age, race, creed, socioeconomic status, and psychological or emotional background.

There are multiple pain assessment tools available for determining the quantity and quality of a patient's pain experience. Proper use of these tools mandates that the assessment occur at the time of presentation, throughout the course of the clinical encounter and after institution of therapy. In an acute care setting, pain intensity should be reassessed within 30 minutes for parenteral administration of medication and 60 minutes after oral therapy is begun. In an outpatient setting, patients should be instructed to contact their care provider with feedback on the efficacy of the therapy prescribed. Dosing adjustments should be made on the basis of the patient's self-report, pattern of pain response to therapy and other clinical indicators available to the clinician for evaluation.

In the assessment of pain, the patient and/or caretakers should be actively involved. The patient or caretaker should be taught how to use the pain scale so they can self-report pain intensity or change in quality. Patients may need to understand that although complete relief is the ultimate goal, it is not always possible. They should determine for themselves what level of discomfort is acceptable and will allow for maximal function with activities of daily living.

Pain Scales: Pain scales are classified as single or multidimensional and self-report or observational. No one scale is consistently associated with more administration- or response-related problems. Several scales are depicted in Table 1, "Assessment Tools for Adults."

The *single dimensional scales* measure only pain intensity and by their nature are self-report. These scales are reasonable for use in acute pain when the etiology is clear (i.e., trauma, pancreatitis, otitis media). The assessment tools in this classification were initially developed for research trials. One concern is that measuring intensity alone may be an oversimplification of the pain experience.

The *multidimensional scales* measure not only the intensity but also the nature and location of the pain and in some cases the impact the pain is having on activity or mood. These are excellent tools in the setting of persistant acute or chronic pain when intensity as well as social support, interference with ADLs and relationship to depression may need to be assessed. Each of these was developed as a self-report but may be completed with the assistance of an interviewer or health care provider.

(Joyce, 1975 [C]; Pasero, 1997 [CNA])

Table 1. Assessment Tools for Adults

Single Dimension			
Scale	**Administration**	**Validated in**	**Comments**
[1]Visual analog scale (VAS)	visual	chronic pain rheumatic disease children > 5	Poor reproducibility with cognitive dysfunction, postop or dementia
[2]Numeric rating scales (NRS)	verbal or visual	rheumatic disease chronic pain trauma cancer illiterate	Detects treatment effects Decreased reliability at extremes of ages, preverbal, visual, auditory or cognitive dysfunction
[3]Verbal description scales (VDS)	verbal or visual	chronic pain	4- or 5-point scales Preferred by some patients to VAS or NRS Dependent on literacy and language Less sensitive for changes in pain
[4]Facial pain scales (FPS-R)	visual	Bieri: adults Bieri: children Wong & Baker: children	Felt easier than NRS or VAS No influence on culture, gender or ethnicity
Multi Dimension			
Scale	**Administration**	**Validated in**	**Comments**
[5]Brief Pain Inventory (BPI)	verbal	cancer arthritis English, Italian and Japanese	Assess location, intensity, pattern Reports meds, pain relief, patient beliefs, interference in quality of life
[6]McGill Pain Questionnaire (MPQ)	verbal	English, French, Norwegian	Long form can take 30 minutes; short form, 2-3 minutes. Measures intensity, location, affective effects, pattern, and other miscellaneous

See the "Resources Available" section for examples of pain assessment tools.

[1] Downie, 1978; Jensen, 1986
[2] Berthier, 1998; Downie, 1978; Jensen, 1986; Jensen, 1996; Paice, 1997
[3] Jensen, 1986
[4] Hicks, 2001; Herr, 1998; Wong, 1988
[5] Cleeland, 1985; Daut, 1983
[6] Melzack, 1983; Melzack, 1987

Pain Assessment in the Elderly

Both acute and chronic types of pain are very common in the elderly. Effective pain management in this population allows for effective mobilization and functional independence, with resultant decreased morbidity. This in turn results in decreases in health care expenditures. In spite of the obvious benefits resulting from adequate pain relief, there are many challenges contributing to the significant risk of uncontrolled discomfort.

The multiple medical comorbidities and impaired functional status in this population present significant challenges in the treatment of pain. Positive correlations have been reported among the number of medications, ratings of depression and amount of pain experienced by this population. Unfortunately, the very medications used to control pain can have intolerable side effects in the elderly; yet, baseline functional impairment may worsen with significant pain. The specifics of these challenges are beyond the scope of this guideline. The American Geriatrics Society Panel is an excellent clinical resource *(AGS Panel on Persistent Pain in Older Persons, 2002 [R])*.

In addition to the challenges of treating, the assessment and reporting of pain present the most problematic area in this population *(Werner, 1998 [D])*. One contributing factor is their own underreporting of discomfort. Some feel it is an expected part of the aging process and they "don't want to bother anyone," and hence do not complain. Likewise, others may use pain to mask other newly developing physical or cognitive disabilities. In addition, those with cognitive impairment present the difficulties of observer-related pain assessment mentioned in Annotation #2. Even in nondemented patients, a correlation of only 0.38 was demonstrated between the elderly patient's report of pain and the RN's assessment of the severity of pain *(Ferrell, 1990 [D]; Ferrell, 1991 [R])*.

There is a paucity of data available on the validity of any of the pain assessment tools in the sick or institutionalized elderly. Psychometrics for the NRS, VDS, VAS and FPS have all been tested in groups of patients older than 65, but for the most part the patients have been cognitively intact and not institutionalized. The assessment of pain in the aged is complicated by decreases in hearing and visual acuity. Tools that require a lot of explanation or visualization to perform will be more difficult and possibly less reliable.

The VAS may be an example of these hindrances to pain assessment in the elderly. It has a reported 25 percent failure rate along with other reports of concern with the difficulty of the VAS for the elderly population. In comparisons with other tools, the VAS has been least preferred by elderly patients. Facial pain scales have been thought to be easier to administer in this population. Theoretically, the Bieri FPS should be good with elderly patients because it does not appear childlike, avoids a happy face and tears. The latter two are significant to prevent bias introduced by personal beliefs and reflections of current health state. The Bieri FPS has been validated for use in cognitively intact, community-dwelling elderly *(Herr, 1998 [C])*. The VDS is felt to be the easiest tool for the elderly to use and in one population was the tool most preferred for pain intensity assessment *(Herr, 1993 [D])*. Specifically the VDS allows patients to describe what they are feeling with common words rather than having to go through the abstract process of converting how they feel to a number, facial representation or a point somewhere on a straight line. Several authors have suggested the importance of allowing elderly patients to choose their preferred tool of pain intensity assessment in order to facilitate the best communication.

One of the most sensitive assessments of pain in the elderly population may actually be the effect the pain is having on their lives, rather than the intensity of the pain itself. Many can maintain necessary activities of daily living in spite of severe pain. However, advanced ADLs or elective activities such as social functions or even walking may correlate better with severity of pain. One may also suppose that as with cognitive ability, any baseline impairment in activity may also worsen with significant pain.

(Gramling, 1992 [C]; Roy, 1986 [D])

Pain Assessment in Infants

Infants cannot verbalize their pain sensations and therefore are entirely dependent on their caregivers to assess their pain and to determine the effectiveness of management efforts.

Preterm infants as young as 20-24 weeks postconception have the anatomic and functional capacity to mount a response to noxious stimuli. Descending pathways from the CNS that inhibit transmission of pain signals may not be developed and therefore the preterm may be more rather than less sensitive to pain.

The consequences of pain are often minimized by health professionals because they are believed to be transient, inconsequential and not remembered. Infants have been shown though to have the capacity for pain memory. Neonates experiencing a painful procedure (circumcision) showed a stronger pain response to subsequent immunizations. Anesthesia for the initial procedure attenuated the subsequent response. The pain itself may not be recalled, but the stress may mediate pain responses later in life.

Although physiological indicators (e.g., increased heart rate, respiratory rate, blood pressure, palmar sweating, intracranial pressure, cortisol levels, decreased oxygen saturation, vagal tone, CO_2 levels) provide precise objective information reflecting the neonate's response to a noxious stimulus, they are more indicative of stress than pain.

The lack of association between physiological and behavioral measures suggests that they may be providing different information about the mechanisms responsible for pain.

The most frequently studied behavioral responses to pain in neonates are the facial activity, crying and body movements.

In infants, a limited number of facial actions have been studied, but they have been found to be consistent across ages and situations. The most widely used measure is the Neonatal Facial Coding System. Predominantly a research tool due to the need for experienced coders and length of time to administer, it has been shown to be sensitive to pain intensity and most helpful in the evaluation of pain management. Both reliability and validity are good, and it has been used at bedside.

An infant's cry has been the most obvious index, but the interpretation has been difficult. A significant proportion of preterm infants do not cry or may be influenced by drugs or mechanical ventilation. The spectral analysis of the cry is occasionally used in research studies but is not practical at the bedside.

Changes in body activity or the withdrawal of a limb in response to a painful stimulus may also be difficult to interpret in the small premature who is mechanically and/or pharmacologically restrained.

(Anand, 1987 [R]; Barr, 1992 [X]; Fitzgerald, 1986 [D]; Gunnar, 1988 [A]; Grunau, 1987 [D]; Taddio, 1997a [B])

Multivariable measurement tools for infants

Two tools using a combination of behavioral and physiological measurements have been shown to be the most practical.

CRIES is a neonatal postoperative pain scale assessing five variables (C-crying, R-requires oxygen, I-increased vital signs, E-expression, S-sleeplessness) on a 0-2 point scale (much like an APGAR score). This scale has been validated against the nonverbal components of the Children's Hospital of Eastern Ontario Pain Scale (CHEOPS). The interobserver reliability was found to be 94%, and it has been useful for repeated bedside observations *(Krechel, 1995 [C])*.

Modified Behavioral Pain Scale (MBPS) utilizes three items (facial expression, cry, movements) from the original CHEOPS scoring. This scale has been validated for 2 to 6 month olds. It has excellent validity and interobserver agreement (95%). It has been studied only as a research tool but holds promise for bedside use.

Two other pain scales for neonates, the Neonatal Infant Pain Scale (NIPS) and the Premature Infant Pain Scale (PIPS), have poor interrater reliability and content validity yet are still utilized at many hospitals because of their simplicity and ease of use.

(McGrath, 1985 [C]; Taddio, 1995 [C])

Pain Assessment in Young Children

In children, pain measures may be influenced by limited cognitive or language skills or by the positive or negative consequences their pain reports or behaviors produce. The caregiver must be aware of the developmental stage of the child to best determine the assessment tool to utilize.

Behavioral observations must be interpreted cautiously and with cultural sensitivity. For example, a child who is sleeping all the time may be in significant pain without crying or whimpering.

Self-report measures are best used in children above the age of 3-4 years. Children may underreport their pain to avoid future injections or other "painful" procedures aimed at alleviating the pain.

(Matthews, 1993 [R])

Table 2. Assessment Tools for Children				
Measure	**Description**	**Indications for Use**	**Advantages**	**Disadvantages**
†Self-Report Measures	Child is asked re intensity, rhythm and variations in pain	Adequate cognitive and communicative abilities	Simple and effective Can be administered easily	Subject to bias (e.g., demand characteristics, inaccurate or selective memory)
†Poker Chip Tool (Hester, 1979)	Child chooses 1 to 4 chips ("pieces of hurt")	4 to 8 years	Correlates with overt behaviors in injections Adequate convergent validity Partial support for discriminate validity	May be childish for older children
†Faces Scale (Bieri, et al., 1990)	Faces indicating intensity were derived from children's drawings	6 to 8 years	Strong agreement among children re pain severity of faces and consistency of intervals Adequate test-retest reliability	Validity studies are not yet completed
†* Visual Analog Scale	Vertical or horizontal line with verbal, facial or numerical anchors on a continuum of pain intensity	5 years and over	Reliable and valid (e.g., child report correlates with behavioral measures and with parent, nurse, physician ratings) Versatile (can rate different dimensions – pain & effect – on same scale)	Must understand proportionality Intervals on numerical scales may not be equal from a child's perspective
†* Oucher Scale (Beyer, Wells, 1989)	6 photos of children's faces indicating intensity; 100-point corresponding vertical scale	3 to 12 years	Reliable, adequate content validity, correlates with other VAS scales Presentation of both pictorial and numerical scales is applicable for broader age range	See VAS
†Pain Diary	Numerical ratings are repeated along with recording of other relevant information (e.g., time, activity, medication)	Older child/adolescent	Adequate interrater reliability between parent and child Useful in determining patterns of pain and in teaching self-management strategies (thereby providing a sense of mastery)	Require commitment to record regularly and accurately Require effort and prompting if moving from one situation to another (memory over time is rarely accurate)
†* Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) (McGrath et al., 1985)	6 observed behaviors: crying, facial expression, verbal expression, torso position and leg position	Originally used for postoperative pain and needle pain	Easy to learn and use Interrater reliability = .80 Concurrent validity	Insensitive to long-term pain
* CRIES (Krechel, 1995)	0-2 points on 5 variables	neonatal postop pain	Interobserver reliability = 94% Useful for requested bedside observation Validated against CHEOPS	
* MBPS (Taddio, 1995)	3 items: facial expression, cry and movements	0-6 months	Excellent validity and interobserver reliability (95%)	Studied only as a research tool thus far

Table 2. Assessment Tools for Children (continued)				
Measure	**Description**	**Indications for Use**	**Advantages**	**Disadvantages**
* Postanaesthetic Recovery Score	0-2 points on 6 variables	Originally developed for use in post-operative pain assessment	Simple and efficient Can be administered easily	Specific to postanesthesia pain assessment
FLACC (Face-Legs-Activity-Cry-Consolability) *(Merkel, 1997)*	Each scored on 3 point scale (0, 1, 2); total 0-10	Young children, postoperative pain, including pre-verbal and cognitively impaired kids	Correlates with parental pain report Easy and quick to use in clinical setting	Relies on all behavioral observations
COMFORT scale *(Ambuel, 1992)*	Score 8-40 on a rating scale of 8 parameters (dimensions)	Newborn to adolescent distress in PICU; postoperative pain 0-3 yr olds	Combines physiological and subjective psychological measures of distress	Objective and subjective indicators are scored with equal weight
Wong-Baker Faces Pain Rating Scale *(Wong, 1988)*	6 cartoon faces, faces graded from smiling to tears	3-8 years, postoperative and procedural pain	Well validated and has been used for many years in many settings	None
Coloured Analogue Scale *(McGrath, 1996)*	Modification of 10 cm horizontal VAS, score 0-10 in 0.25 increments, gradations in color and area, labels "no pain" to "most pain"	5 years and above	Easier to administer and score than a VAS. Measures both intensity and affective psychophysical parameters	None
Non-Communicating Children's Pain Checklist (NCCPC-R), postoperative version (NCCPC-PV) *(Breau, 2002)*	Compilation of behaviors reported by caregivers associated with potentially painful stimuli and that discriminate from distressful or calm events	3-20+ years in non-communicating or cognitively impaired children and young adults especially for post-op pain	> 75% sensitive & specific to detect significant pain. Familiarity with the patient not necessary to get accurate assessment	Requires a 10-minute observation time period to accurately assess all the parameters

†*Reprinted with permission from Pain in Infants, Children and Adolescents. Schecter NI, Bearde CB, Yaster M, eds. Baltimore: Williams and Wilkins, 1992: Table 8.1, page 99.*

* See the "Resources Available" section for examples of pain assessment tools.

6. Has Pain Persisted Greater Than 6 Weeks?

If the patient has not been previously evaluated, attempt to differentiate between untreated acute pain and ongoing chronic pain. If a patient's pain has persisted for six weeks (or longer than the anticipated healing time), a thorough evaluation for the cause of the chronic pain is warranted. See the ICSI Chronic Pain guideline for more information.

10. Determine Mechanism(s) of Pain

Key Points:

- The physiology of pain guides the practitioner to more effectively and efficiently control pain.
- The clinician should be aware that the patient may experience a combination of pain types.

By identifying the type of pain, the provider can more efficiently treat pain by selecting the intervention most appropriate. **The clinician should be aware the patient may experience a combination of pain types.** See Appendix A for an assistive tool in determining mechanism of pain.

The physiology of pain guides the practitioner to more effectively and efficiently control pain. An understanding of the physiology of pain entails familiarity with transmission of the painful experience.

Nociception is the detection of painful stimuli; this initiates the chain of events of pain transmission. The site of the injury gives rise to a release of prostaglandin that is the precursor to impel the painful impulse through the peripheral nervous system to the spinal cord where Substance P (a neurotransmitter) is released, facilitating the impulse through the spinal cord to the brain, in particular the cerebral cortex. Nonsteroidal anti-inflammatory drugs inhibit the synthesis of prostaglandin (PGE2).

PGE2 are potent vasodilators producing pain and edema and are quite active in arthritis, musculoskeletal injuries and bone disorders.

At the periphery there is generation of an "action potential," which allows for the transmission of pain through the peripheral nerve. The action potential is the result of an exchange of ions along the inner and outer neural membrane. Anticonvulsants and local anesthetics block this influx and efflux of ions, preventing the generation of the action potential.

Within the spinal cord there is a release of many substances responsible for transmitting pain. They are Substance P, cholecystokinin, calcitonin gene-related peptide, and excitatory amino acids. These are released by the primary afferent neurons and stimulate the ascending fibers towards the brain. Opioids bind to the opiate receptors within the spinal cord at the substantia gelantinosa where there are two actions: 1) blocking the pain transmission, and 2) inhibiting the release of the above neurotransmitters.

Within the brain, the ascending tract enters by way of the periaqueductal grey, the reticular formation, and the thalamus, where it continues to travel along to various areas of the limbic system (the emotional center) and cerebral cortex. Experts believe awareness of pain occurs in the somatosensory cortex. Opiate receptors in the brain are located in the periaqueductal grey and this is where systemic narcotics bind to create analgesia.

The diminishing of the painful response occurs in the descending tract, which originates in the higher centers of the brain and descends to the dorsal horn of the spinal cord. This is where there is a release of endogenous opiates (enkephalin and dynorphin), serotonin and norepinephrine. It is at this level that the tricyclic antidepressants work by preventing the reuptake of serotonin and norepinephrine and thereby facilitating analgesia.

(Basbaum, 1984 [R]; Bonica, 1990 [R]; Rowbotham, 1989 [D]; Yaksh, 1981 [R])

The algorithm acknowledges that in most clinical situations the initial treatment of pain and the diagnostic workup occur concurrently. In other situations, e.g., CNS injury, it may be important to delay treating a patient's pain until the underlying diagnosis is established. These initial efforts to treat pain are based on the clinician's initial hypothesis of the etiology of the patient's pain.

See the Clinical Pearls section in Annotation #17, "Prevention/Intervention."

11. Somatic Pain

Somatic pain results from tissue damage that causes the release of chemicals from injured cells that mediate pain and inflammation via abundant nociceptors found in the skin and body wall.

Somatic pain is typically of recent onset, well-localized, and is described as sharp, aching, stabbing or throbbing in character. Its cause is usually apparent. Somatic pain originates from specific nerve ending receptors, making it typically well localized. Traumatic injury results in somatic pain. Typical examples include lacerations, sprains, fractures and dislocations.

12. Visceral Pain

Visceral pain nociceptors are similar to those found in the skin and body wall. However, visceral nociceptors are fewer in number, and when stimulated, result in poorly localized, diffuse and vague complaints (generalized ache/pressure) that may be referred to sites remote from the primary injury. Visceral afferent fibers converge on the same dorsal horn neurons as somatic afferent fibers resulting in referred pain to the cutaneous area innervated at that level.

The cause of visceral pain may include ischemia/necrosis, inflammation, ligamentous stretching, smooth muscle spasm, and distension of a hollow viscous or organ capsule. For example, rhythmic contractions of smooth muscles may result in a cramping type of visceral discomfort. Reflex skeletal abdominal muscle contraction results from an inflamed peritoneum resulting in a rigid abdomen.

Primary visceral pain afferents usually course along with autonomic nerve fibers. For example, abdominal and thoracic visceral pain fibers travel with sympathetic nervous system fibers; esophageal and pharyngeal pain fibers travel with vagal and glossopharyngeal afferents; and deep pelvic structure pain fibers travel with the sacral parasympathetics. Thus, a hallmark of visceral pain will include autonomic symptoms such as nausea/vomiting, hypotension, bradycardia and sweating.

The goal in the treatment of visceral pain is to identify and then reduce or eliminate the causative factors. In general, visceral pain is treated not unlike somatic pain and may respond best to opioid therapy.

(Cervero, 1999 [R]; Fine, 1998 [R]; Ganong, 1997 [R]; Phillips, 1986 [R])

13. Neuropathic Pain

Neuropathic pain implies an injury to a neural structure leading to aberrant processing in the peripheral and/or central nervous system. Neuropathic pain is distinguished from nociceptive (somatic and visceral) pain. Nociceptive pain results from activation of nociceptors from a defined noxious stimulus, whereas neuropathic pain results from damage to or dysfunction of a nerve. However, the presence of nociceptive and neuropathic pain frequently coexists.

Patients who experience neuropathic pain often complain of dysesthesias (abnormal pain complaints), which are typically not like any previous pain experience. Frequently, pain is described as burning, tingling, electrical-like or shooting. Examination may reveal allodynia (pain on light touch), hypalgesia or hyperalgesia (relatively decreased or increased perception of a noxious stimulus), or hyperpathia (exaggerated pain response). In neuropathic pain, symptoms are initially experienced distal to the site of injury, whereas in nociceptive pain, symptoms are initially apparent at the site of injury.

Neuropathic pain is commonly experienced by patients with conditions such as diabetes, shingles, multiple sclerosis, herniated discs, and acquired immunodeficiency syndrome (AIDS). Neuropathic pain may also result from treatment with radiation or chemotherapy.

A Dermatome Map is available through the ICSI Acute Pain Toolkit. See the "Resources Available" section for Web site information.

Treatment Algorithm Annotations

14. Somatic Pain Treatment

Treatment of somatic pain includes the use of acetaminophen, cold packs, corticosteroids, localized anesthetic (topical or infiltrate), NSAIDs, opioids and tactile stimulation *(Fine, 1998 [R]; Ganong, 1997 [R]; Phillips, 1986 [R]).*

15. Visceral Pain Treatment

Treatment choices for visceral pain include corticosteroids, intraspinal local anesthetic agents, NSAIDs and opioids (via any route).

(Cervero, 1999 [R]; Fine, 1998 [R]; Ganong, 1997 [R]; Phillips, 1986 [R])

16. Neuropathic Pain Treatment

Neuropathic pain may be resistant to standard opioid therapies or other nociceptive pain treatment strategies. Anticonvulsants and tricyclic antidepressants are mainstays of therapy. Complaints of continuous burning may best respond to antidepressants, whereas lancinating complaints may best respond to anticonvulsants. The anticonvulsant gabapentin, however, can treat both continued burning and episodic neuropathic pain. Failure to adequately relieve neuropathic pain with one anticonvulsant does not imply that alternative therapies will not work. Other potential treatments include local anesthetics (topical or intraspinal), tramadol and glucocorticoids.

(Dworkin, 2003 [R]; Fine, 1998 [R]; Portenoy, 1997 [R])

17. Prevention/Intervention

Key Points:

- Choices for intervention are varied and frequently involve multiple disciplines.
- With proper education and training of patients prior to a painful experience, the ability to cope and the outcome of pain treatment may be enhanced.
- The use of pharmacological agents is considered to be the mainstay of therapy for acute pain.
- Patient satisfaction can be substantially improved with non-pharmacologic approaches.

Prevention

Patient education

The ability to influence a patient's pain experience may be approached in multiple ways. Choices for intervention are varied and frequently involve multiple disciplines.

With proper *education and training of patients* prior to a painful experience, the ability to cope and the outcome of pain treatment may be enhanced.

Key patient education steps and messages

- Describe the expected type of pain and how long it will last. (Preparatory Sensory Information – decrease uncertainty and fear of unknown. "Knowledge is power.")
- Individualize the information for the patient.
- Discuss goals of pain management and how these goals help the patient: comfort, quicker recovery and avoidance of complications.
- Preventing pain is important to manage pain well. "Stay ahead of the pain."
- Many drug and non-drug treatments can be helpful in preventing and managing pain.
- Inform the patient of when and how to contact health care providers about his/her pain.
- Patients, parents of children with pain, and the health care providers will decide as a team which treatments are best to manage the pain.
- Discuss treatment choices and plan, including schedule of medications, that are most appropriate for the patient.
- Addiction to opioids used in the treatment of acute pain is rare. There are differences among physical addiction, tolerance and psychological dependence.

Intervention

Table 3. Acute Pain Interventions

Pharmacologic Therapy

Intravenous Agents	Oral Agents	Rectal Suppositories	Topical Agents	Subcutaneous Agents
Anticonvulsants	Anticonvulsants	Acetaminophen	Capsaicin[4]	Local anesthetics
Ketamine	Antidepressants	Aspirin	Cold	Opioids
Non-steroidal anti-inflammatory drugs	Antihistamines	Opioids	Heat	
Opioids[1,2]	Anxiolytics	Phenothiazines	Lidocaine/prilocaine	
	Corticosteroids		Local anesthetics	
	Hypnotics			
	Local anesthetics			
	Non-steroidal anti-inflammatory drugs[3]			
	Opioids			
	Tramadol			

Intervention/Surgical Procedures

Pain specialists may offer localized injections or more invasive procedures to help treat acute pain. Getting a pain specialist consultation is warranted when considering interventions.

Non-Pharmacologic Approaches

Biofeedback
Exercise
Heat/cold
Immobilization
Massage
Relaxation
Transcutaneous electrical nerve stimulation

[1]Refer to institutional protocol for patient-controlled analgesia (PCA). [2]Titrate to effect. [3]Contraindication: Avoid or use with caution in patients with a history of GI bleeding or renal insufficiency. [4]Contraindication: Avoid contact with eyes and mucous membrane.

Medications and interventions are selected based on symptomatology and mechanism of pain. Choosing the regimen that is the most responsive to the pain complaint and has the least potential for side effects should be done initially. Visceral, somatic and neuropathic pain complaints respond most effectively to different

treatments. (See Appendix A, "Determining Mechanism of Pain.") The route of administration often affects patient compliance and dosing requirements.

Pharmacological Therapy

Review safe medication use

Policies and procedures regarding safe medication use should be in place.

The use of pharmacological agents is considered to be the mainstay of therapy for acute pain. There are three broad categories of medications to consider when treating the patient with acute pain: non-opioid analgesics (NSAIDs), opioid analgesics and coanalgesics. They are used in this manner:

Non-opioid analgesics (NSAIDs and acetaminophen):

- Should be considered initially. Often adequate for *mild* or *moderate* pain, or in the case of ketorolac for moderate to severe pain.
- Have significant opioid dose-sparing properties and in turn reduce opioid-related side effects *(Clark, 2007 [A])*.
- A meta-analysis found a 20% decrease in morphine doses when scheduled acetaminophen was combined with patient-controlled analgesia (PCA) morphine for treatment of pain after major surgery *(Remy, 2005 [M])*.
- Use with caution in patients with coagulopathies or thrombocytopenia and those who are at risk for bleeding.
- Watch for GI effects, especially with these risk factors: age greater than 60 years, previous gastrointestinal events and concomitant corticosteroid use.
- Ketorolac, either parenteral or oral, should be used for no more than five days; dose reduction is indicated in the elderly and in those with renal impairment. *[Conclusion Grade III: See Conclusion Grading Worksheet A – Annotation #17 (Ketorolac)]*

NSAIDs are useful in the treatment of acute pain due to a variety of etiologies, including trauma, postoperative pain and arthritis. Mild to moderate acute pain can often be adequately controlled with the use of an appropriate NSAID. Even when used in the treatment of moderate to severe pain secondary to surgery, NSAIDs have a significant opioid dose-sparing effect and can therefore reduce opioid-related side effects.

Before using NSAIDs, the hematological, gastrointestinal and renal effects should be taken into consideration. All but two NSAIDs, choline magnesium and salicylate, have been shown to inhibit platelet aggregation by inhibiting prostaglandin synthetase. Therefore, care must be used when prescribing NSAIDs in patients with coagulopathies or thrombocytopenia and in those who are at risk for bleeding.

Ketorolac, either parenteral or oral, should be used for no more than five days; dose reduction is indicated in the elderly and in those with renal impairment *(Corelli, 1993 [D]; Pearce, 1993 [D]; Strom, 1996 [B]; Murray, 1993 [D]; Steinberg, 1993 [D]; Feldman, 1997 [B]). [Conclusion Grade III: See Conclusion Grading Worksheet A – Annotation #17 (Ketorolac)]*

The use of NSAIDs can also cause various gastrointestinal effects ranging from mild dyspepsia to more serious reactions such as bleeding and perforation. In a meta-analysis of the relative risk for serious gastrointestinal complications, users of NSAIDs were at approximately three times greater risk of developing serious gastrointestinal side effects than were non-users. Additional factors that appear to make an individual at a greater risk for gastrointestinal side effects are age greater than 60 years, previous gastrointestinal events and concomitant corticosteroid use.

(Gabriel, 1991 [M]; Henry, 1993 [C]; Brown, 1990 [A]; Wolfe, 1999 [R])

An American Heart Association advisory committee discussed the issues regarding the possibility of increased cardiovascular events in patients taking NSAIDS *(Bennett, 2005 [R])*. In regards to patients with known, or risk factors for, cardiovascular disease, the AHA recommends that COX-2 inhibitors should be limited to those patients for whom there are no other therapy options. If it is determined that the use of COX-2 inhibitors is necessary, the lowest possible dose should be used and for the shortest duration necessary.

Opioid analgesics:

- If pain is not adequately controlled with an NSAID or is expected to be *moderate* to *severe*, an appropriate opioid should be added to the NSAID.
- In patients with absolute or strong relative contraindications to NSAIDs, an opioid for mild to moderate pain should be considered.
- Morphine is considered to be the standard opioid analgesic.
- Meperidine is not considered a first-line opioid analgesic medication for acute pain syndromes.
- See Appendix B, "Opioid Analgesics," also "Managing Acute Pain in Chemically Dependent Patients/Recognizing Substance Abuse" in Annotation #17.

Opioids are used for the treatment of moderate to severe pain from various etiologies. If not contraindicated, the management of acute pain should begin with the use of an appropriate NSAID. If the pain is not controlled with an NSAID, or moderate to severe pain is expected, an opioid should be added in combination therapy. Patients should be titrated to pain relief first with short-acting opioid agents before being placed on sustained-release preparations (i.e., transdermal fentanyl or long-acting oxycodone). While long-acting dosage formulations have several advantages for chronic pain patients, their slow-release results in a time delay to reach a therapeutic benefit, which makes them inappropriate for the treatment of acute pain.

When opioids are used appropriately to treat acute pain in the nonchemically dependent patient, physiological dependence or tolerance to the opioid is quite uncommon *(Collins, 1992 [R])*. Also, these same patients are unlikely to develop psychological dependence or addiction when opioids are used appropriately in the short-term management of acute pain *(Joransen, 2000 [D])*. There are many opioid agents to select from, and the practitioner should become familiar and comfortable with their pharmacological kinetics and their appropriate indications. The standard opioid by which others are measured is morphine sulfate. Codeine, oxycodone or hydrocodone are reasonable alternative choices due to fewer side effects.

Opioids can unexpectedly produce hyperalgesia, an increased response to a stimulus that is normally painful. Case reports indicate this happens most often in cases where there was a rapid escalation of opioid doses *(Mercadante, 2003 [D]; Mercadante, 2005 [D])*. The mechanism is not clearly understood, which makes it difficult to identify specific treatment. Switching to another opioid and spinal intervention has been reported to effectively stop the vicious cycle of pain-declining analgesia-opioid escalation-hyperalgesia. Research continues in this area to better understand the underlying cause and treatment options.

Tramadol, a non-opioid that acts on mu-receptors, is another reasonable alternative.

Meperidine is an opioid analgesic that has been historically used for the relief of acute pain despite recommendations otherwise.

The metabolism of meperidine can lead to serious side effects *(Armstrong, 1986 [D])*. Meperidine is metabolized to a toxic metabolite called normeperidine. Normeperidine is a CNS irritant and appears to cause tremors, muscle twitches, dilated pupils, hyperactive reflexes and convulsions. The half-life of normeperidine is 15-20 hours compared to the 3-hour half-life of meperidine. Since the kidney and liver eliminate normeperidine, patients with decreased renal or hepatic function are at an increased likelihood of suffering from the toxic effect of normeperidine *(Szeto, 1977 [D])*.

(Miller, 1978 [D])

Meperidine is not considered a first-line opioid analgesic medication for acute pain syndromes. If used, dosing limitations are necessary to prevent central nervous system (CNS) excitatory toxicity from normeperidine accumulation, a metabolite of meperidine. Patients with impaired renal function and elderly individuals are at particularly high risk of CNS toxicity. Patients receiving meperidine should be monitored for symptoms and signs of CNS excitation. *[Conclusion Grade II: See Conclusion Grading Worksheet B – Annotation #17 (Meperidine)]*

Ketamine

Ketamine is an anesthetic drug with analgesic properties. It is a potent N-methyl-D-aspartate (NMDA) antagonist. The NMDA receptor plays an important role in the development of central sensitization, described as hyperalgesia and the development of the "wind-up" phenomenon. Wind-up describes what is observed during repetitive noxious stimulation resulting in progressively increasing pain intensity. Ketamine may also prevent development of acute tolerance to opioids and opioid-induced hyperalgesia. Thus, the ability of a drug to block this receptor is advantageous in acute pain control. However, when administered in high doses, ketamine has significant side effects that limit its usefulness. Hallucinations, paranoia, vivid dreams or delusions, delirium and floating sensations may be experienced. Limiting the dose and providing a benzodiazepine may help limit these side effects.

The use of ketamine for acute pain control remains controversial. Human studies show mixed results in its ability to provide effective pain relief when used in combination with opioids. Low-dose ketamine infusion has been found useful in limiting opioid requirements in patients undergoing major abdominal surgery. Low-dose ketamine may be indicated in opioid resistant pain control in cancer patients who have preexisting opioid tolerance. Combining ketamine with morphine in patient-controlled analgesia (PCA) devices has not been proven to be efficacious.

(Subramaniam, 2004 [M]; Schulte, 2004 [A])

Patient controlled analgesia (PCA)

Patient controlled analgesia (PCA) refers to the method where the patient self-administers analgesics, according to the clinician's order, to control his/her own pain. Most of the time, this refers to a programmable infusion pump that delivers an intravenous opioid to control pain; however, other methods and routes of delivery have been used, such as subcutaneous infusions *(Lehmann, 2005 [R])*.

PCA administration can consist of a patient-controlled demand (bolus) dose given at some frequency and/or some continuous rate of opioid infusion (usually expressed as mg/hour) along with a lockout interval. Lockout interval refers to the time between boluses where the pump will not allow any more bolus doses to be administered.

Patient-controlled analgesia is more than just IV administration of opioids; however, this guideline will only delineate IV PCA because its use has more potential for dangerous side effects *(Hauer, 1995 [R])*.

- The key to safe use of PCA is close monitoring by the professional. Monitoring parameters should be established to meet individual institutional needs.
- The first 24 hours after surgery represent a high-risk period for a respiratory event, and sedation is highest within the first 12 hours postoperatively *(Taylor, 2005 [C])*.
- The relative safety of continuous infusion is increased if a patient's opioid requirements are already known and the rate of infusion is based on those requirements.
    - Continuous infusion should be used with caution in patients with sleep apnea and those who are morbidly obese *(Macintyre, 2005 [R])*.

- Patients with a history of opioid consumption (whether legally or illegally obtained) may require higher than average PCA dosages.
- PCA is an effective method of pain relief in the elderly.
- If stable pain rating, as determined collaboratively by clinician and patient, monitoring may be less frequent.
- Naloxone should be readily available.
- Determining dose for equalanalgesic conversions should be based on the calculation of mg used/24 hours.

Momeni, et. al (2006) is a recommended resource for administration details and outcomes *(Momeni, 2006 [R])*.

The primary advantage of PCA therapy is the patient convenience since the patient controls when a dose of analgesic is given; the patient is not dependent upon a nurse to get a dose of analgesic. If appropriate doses of opioids are prescribed, the patient should not be at risk of respiratory depression because with repeated boluses, the patient falls asleep, avoiding additional doses that might cause respiratory depression. The drawbacks of PCA include the increased expense of administering the medication because the pump and equipment are relatively expensive.

Safe dosing of opioids for PCA is patient-dependent. Generally, lower doses are used for the elderly and opioid-naive patients, while equalanalgesic calculations should guide the prescriber for chronic opioid patients who now have acute pain. Opioid doses may be titrated based on analgesia and side effects.

When intravenous access is not possible, PCA may be administered via the subcutaneous route.

Inappropriate candidates for PCA therapy include those patients who are physically or cognitively unable to self-administer demand/breakthrough medication. In the treatment of acute pain, each institution should have guidelines delineating who may administer the demand dose, in order to safely provide analgesia.

Breakthrough pain

Expert consensus has suggested the following guide for breakthrough dosages: 10 to 20 percent of the total daily long-acting oral opioid dose. Since the duration of action of many oral short-acting opioids is around four hours, the frequency may be every four hours as needed for breakthrough pain *(Gammaitoni, 2003 [R])*.

Coanalgesics

Coanalgesics are used to complement NSAIDs and opioids and may be used alone for the treatment of acute pain, especially neuropathic pain.

Some have been shown to enhance the effect of a particular analgesic, such as caffeine when given with aspirin like drugs; others have analgesic properties themselves, e.g., tricyclic antidepressants and hydroxyzine.

The use of adjuvant therapies and medications is frequently helpful in reducing the total drug dose of opioids and NSAIDs, and speeding recovery. These medications may treat acute pain alone but are often used in combination with other analgesic therapies.

Tricyclic antidepressants (TCAs)

Tricyclic antidepressants have been studied and found effective for the treatment of neuropathic pain, especially diabetic neuropathy *(Argoff, 2006 [R])*. Since many of these drugs also cause sedation, once-daily dosing at bedtime may help with pain relief and improve sleep architecture. While controlled trials have demonstrated pain relief in diabetic neuropathy and post-herpetic neuralgia, TCAs have been used to treat

neuropathic pain due to surgical trauma and other nerve injuries without the support of controlled clinical trials. Amitriptyline has been the best studied for the treatment of neuropathic pain; however, its usefulness has been limited by the significant side effects of sedation, orthostatic hypotension and anticholinergic effects (e.g., dry mouth, urinary retention, delirium).

Antiepileptic drugs (AEDs)

It is thought that AEDs may decrease ectopic spontaneous firing of sensory neurons associated with neuropathic pain. Gabapentin is the best-studied AED for treatment of neuropathic pain and is approved for post-herpetic neuralgia. Pregabalin, a drug structurally similar to gabapentin, is approved for the treatment of diabetic peripheral neuropathy, postherpetic neuralgia and fibromyalgia *(Freynhagen, 2005 [A]; Lesser, 2004 [A])*. Gabapentin is usually dosed three to four times daily for patients with normal kidney function but requires a decreased dosage for renal impairment; pregabalin is dosed two to three times daily and also should be dose adjusted for renal impairment. Elderly patients should be initially started at lower doses of gabapentin in order to minimize side effects. Doses are typically adjusted depending on response and side effects. The most common side effects of gabapentin and pregabalin are somnolence, dizziness, peripheral edema and nausea. A recent meta-analysis examined the effectiveness of adjunctive gabapentinoids in the treatment of acute postoperative pain. Though found effective, the exact dosing amount and duration of therapy is yet to be determined *(Tiippana, 2007 [M])*.

Local anesthetics

While local anesthetics have been used for years for acute pain management, topical application may be useful in selected patients. Topical lidocaine patches are FDA approved for the treatment of postherpetic neuralgia. Since the patches may be cut to fit the size of the affected area, this is a useful alternative if the painful area is small and localized.

Managing acute pain in chemically dependent patients/recognizing substance abuse

Chemically dependent patients are often undertreated with opioids when they have surgery. Nurses and doctors are typically unaware of the amount of medication it takes to actually achieve analgesia in a chemically dependent patient. When providers have to administer large doses of opioid to control pain, they may be afraid of causing respiratory depression and potentially enhancing the addiction.

This problem is not novel, but it has been and continues to be a neglected problem. There are guidelines that help identify potential problems. However, the issues surrounding pain as well as chemical dependency are complex and the plan of care needs to be individualized. As pain management experts and addiction medicine experts continue to work together, more will be known in the future about how these two issues intertwine. In 1980 a landmark report was published by Porter and Jick indicating that addiction is rare in patients treated with opioids for acute pain (*Porter, 1980 [D]*). Savage, 2002 emphasizes the need for proper assessment in these patients. Nevertheless there is an overwhelming concern about causing addiction in someone with acute pain *(Savage, 2002 [R])*. This overestimation of the risk of addiction originates from an inadequate understanding of the characteristics that define this syndrome, and inappropriate extrapolation of information derived from the addict population.

Despite certain behaviors that may help identify drug seeking in substance abuse patients *(Longo, 2000 [R])*, drug and alcohol screening guidelines and questionnaires described in the literature lack the predictive value to recommend their widespread clinical use.

(See also Appendix C, "DSM-IV Diagnostic Criteria for Substance Dependence.")

Specialty Consult (if indicated)

General surgical, orthopedic, anesthesiological or other consultation may be deemed necessary.

Intervention/Surgical Procedures

Procedures are used for both diagnostic and therapeutic effects and should be performed by experienced providers.

Preemptive analgesia

Clinical studies have indicated that painful stimuli may produce changes in the spinal cord that in turn influence the response to further stimuli. The hypothesis of *preemptive analgesia* states that, by preventing the sensitization of the central nervous system that would normally amplify subsequent nociceptive input, one may reduce the severity of postoperative pain. The neuroplastic response may be prevented by appropriate administration of analgesics before the stimulus in order to block painful nerve transmission. Thus, to be considered preemptive, the intervention must be given before the actual insult (e.g., surgical incision). A nerve conduction block is typically required, either by infiltration of local anesthetics near the site of expected injury or by neuraxis blockade in the epidural or intrathecal spaces, also with local anesthetic. The use of neuraxial opioids may also play a role. Application of local anesthetics or opioids near the spinal cord is usually performed by an anesthesiologist. The N-methyl-D-aspartate (NMDA) receptor is also thought to play a key role in the development of central nervous system sensitization. Thus, the use of an NMDA antagonist may be helpful. However, results of studies evaluating the effects of preemptive analgesia have been mixed and have not shown definitive benefits *(Katz, 2002 [M])*.

(Gottschalk, 1998 [A]; Katz, 1992 [A]; Tverskoy, 1990 [A])

Non-Pharmacologic Approaches

There is growing interest among patients and providers in non-pharmacologic complementary therapies for acute pain. Little conclusive advice can be drawn from studies available to date for several reasons. First, there is a broad range of therapeutic modalities, including:

- Education
- Immobilization (e.g. bracing, bed rest)
- Physical (e.g. massage *(Nixon, 1997 [A])*, heat, cold, TENS)
- Cognitive/Behavioral *(Chen, 2000 [R])* (e.g., biofeedback, relaxation *[Chou, 2007 (R)])*
- Exercise (e.g., back school, graded exercise) *(Nadler, 2004 [R])*

Likewise, studies cover diverse conditions, such as headaches, low back pain, blood draws/injections *(Mathai, 2006 [A]; Hasanpour 2005 [A])*, perioperative pain, neck pain, and tooth extraction *(Michalek-Sauberer, 2007 [A])*. Even when similar conditions and treatments are compared, the method of delivering specific therapies often isn't uniform among providers. Furthermore, the majority of studies focus on chronic pain, not acute. For example, one major review found several studies demonstrating efficacy of acupuncture in chronic neck pain, but there were no similar studies involving acute neck pain *(Trinh, 2006 [M])*. Finally, outcome measures amongst studies tend to be heterogenous or lack statistical significance. Several studies have shown a small positive effect of non-pharmacologic treatments, but it remained unclear if the effect was adequate to justify the cost *(Cepeda, 2006 [A]; Eisenberg, 2007 [A])*.

Non-pharmacologic treatment of low back pain appears to be the best studied. A recent extensive review *(Chou, 2007 [M])* found that for acute low back pain, only heat application bore strong evidence for efficacy *(Nadler, 2002 [A])*. Conflicting evidence has been noted with transcutaneous electrical nerve stimulation (TENS) and ultrasound and numerous other treatments. Nonetheless, even when a significant decrease in pain isn't shown, patient satisfaction can be substantially improved with non-pharmacologic approaches. *(Eisenberg, 2007 [A]; Kim, 2006 [A])*.

Clinical Pearls

Pediatric

- **Circumcisions**: The March 1999 Task Force Report from the American Academy of Pediatrics states, "If a decision for circumcision is made, procedural analgesia should be provided. Dorsal penile nerve block (DPNB), EMLA (eutectic mixture of local anesthetics), topical lidocaine, and ringblock have all been shown to be efficacious and safe but none completely eliminate the pain of circumcision" *(Stang, 1997 [A]; Task Force on Circumcision, American Academy of Pediatrics, 1999 [R])*.
- **Percutaneous procedures:** Eutectic mixture of local anesthetic (EMLA): Mixture of lidocaine and prilocaine applied under occlusive dressing (onset of action of 60-90 minutes) has been shown to be useful in venapuncture, intravenous access, circumcision and meatotomy *(Robieux, 1991 [A]; Taddio, 1997b [A]; Taddio, 1998 [M])*. There have been concerns about methemoglobinemia, which thus limits its use in neonates or infants. Recent studies in small populations demonstrate little toxicity.
- **Intramuscular injections** should be avoided if possible; most surveys indicate children would rather experience pain *(Halperin, 1989 [A])*.
- **Acute musculoskeletal pain:** A single dose of ibuprofen was shown to provide better analgesia than codeine or acetaminophen. Despite its superiority, according to the authors, "ibuprofen alone is not adequate for relieving pain in all children with musculoskeletal injuries" *(Clark, 2007 [A])*.

Adults

- **Acute ureteral colic:** Parenteral NSAIDs are more effective than meperidine *(Labrecque, 1994 [M]; Larkin, 1999 [A]; Oosterlinck, 1990 [A])***.**
- **"As-needed" basis:** For optimal treatment of acute pain, avoid the use of intramuscular injections ordered on an "as-needed" basis *(Cordell, 1996 [A])*. Acute pain medications should *initially* be titrated to effect and then given on a scheduled basis.
- **Suturing non-end-artery sites**: Use TAC (tetracaine, adrenaline and cocaine solution), or LET (lidocaine, epinephrine and tetracaine solution) *(Bonadio, 1989 [R]; Schaffer, 1985 [A]). See supporting references for solution concentrations*.
- **Head injury and stroke:** Avoid strong opioids to allow adequate patient assessment. Strong opioids may also decrease respiration rate, which may adversely affect (increase) intracranial pressure *(Sperry, 1992 [D])*.
- **Medication interaction:** Oxycodone, hydrocodone, codeine and tramadol may not be effective analgesics when given with other agents that strongly inhibit the Cytochrome P4502D6 liver enzymes *(Poulson, 1996 [A]; Sindrup, 1995 [R])*. Common agents with this characteristic include some selective serotonin reuptake inhibitors *(Ereschefsky, 1996 [R])*.
- **Propoxyphene** is no more effective than acetaminophen in acute pain *(Frerich, 1981 [C])*.
- **"Road rash":** NSAIDs (any route) or local anesthetic can be used.

21. Has Pain Persisted Greater than 6 Weeks?

If the patient has not been previously evaluated, attempt to differentiate between untreated acute pain and ongoing chronic pain. If a patient's pain has persisted for six weeks (or longer than the anticipated healing time), a thorough evaluation for the cause of the chronic pain is warranted. See the ICSI Chronic Pain guideline for more information.

24. Intolerable Symptoms Secondary to Treatment?

Key Points:

- Intolerable symptoms could be related to either the pain medication (particularly the opioid) or other causes.
- Patients should be given information about possible side effects and other symptoms that should be reported to nurse or provider.

Intolerable symptoms that could be related to either the pain medication (particularly the opioid) or other causes including:

- Decrease in mental status
- Confusion or delirium
- Nausea and vomiting
- Constipation or prolonged ileus
- Pruritus
- Urinary retention

The identification of pain through patient self-report, or when that's not possible, through a behavioral rating scale, will dictate the reduction of the opioid dosage or frequency. However, it should not be assumed that the opioid is always the cause.

The differential for *decrease in mental status, confusion or delirium* is vast. *Nausea and vomiting* may be related to physiologic causes and other medication side effects, as well as pain medications. The cause should be determined. See Annotation #25, "Side Effect Management."

Accurate documentation of bowel function should be done by the nurses in the postoperative setting. *Constipation* could be caused by immobility, all types of medications, metabolism dysfunction, etc., and is best treated from a prevention standpoint rather than after the patient complains. It is usually the belief that *prolonged ileus* is caused by postoperative opioids. Slowing of bowel function may be due to pain itself. The tendency in the surgical setting is to decrease or stop the opioid if an individual has prolonged ileus. If this is a strong opinion, then efforts need to be continued to control the individual's pain through other means, e.g., local anesthetics or NSAIDs.

Patients should be given information about possible side effects and other symptoms that should be reported to nurse or provider.

25. Side Effect Management

Symptom control of drug-induced problems:

Opioids

- Nausea and vomiting: consider adding scheduled antiemetics at first, and then transition to as needed dosing.
- Constipation: Start an opioid, start a bowel program with a stimulant. Avoid fiber laxatives as they may cause gas, bloating and cramping.
- Itching: consider changing the opioid to a different chemical class of opioid. May also use scheduled antihistamines.

- Myoclonus: consider switching to a different opioid or cautiously use a benzodiazepine to treat the myoclonus.
- Respiratory depression: In order to reverse respiratory depression due to opioids, mix naloxone 0.4mg with 0.9% sodium chloride 9 ml (total volume = 10 ml). Administer 0.02 mg (0.5 ml) boluses every minute until the respiratory rate increases. This may need to be repeated if the patient is receiving long-acting opioids.

NSAIDs

- Gastrointestinal upset: Add a proton pump inhibitor.
- Bleeding problems due to platelet dysfunction: Consider changing to an NSAID with no effect on platelet aggregation.

It is key during patient education to explain pertinent side effects to medications and how to manage. Inform the patient that medications can cause side effects that can be managed or decreased.

26. Follow Up/Reassess

Reassessment should be continued at regular intervals, after any intervention, once a sufficient time has elapsed for the treatment to reach peak effect.

General guideline:

Parenteral medication	30 minutes
Oral medication	60 minutes
Non-pharmacologic intervention	30-60 minutes

The plan identifies the patient's continuing pain management needs and should be communicated to the patient with regards to appropriate follow-up.

Appendix A – Determining Mechanism of Pain

Type of Pain			
	Somatic Pain	**Visceral Pain**	**Neuropathic Pain**
Location	Localized	Generalized	Radiating or specific
Patient Description	Pinprick, or stabbing, or sharp	Ache, or pressure, or sharp.	Burning, or prickling, or tingling, or electric shock-like, or lancinating
Mechanism of Pain	A-delta fiber activity Located in the periphery[1]	C Fiber activity Involved deeper innervation[1]	Dermatomal[2] (peripheral), or non-dermatomal (central)
Clinical Examples	• Superficial laceration • Superficial burns • Intramuscular injections, venous access • Otitis media • Stomatitis • Extensive abrasion	• Periosteum, joints, muscles • Colic and muscle spasm pain* • Sickle cell • Appendicitis • Kidney stone	• Trigeminal • Avulsion neuralgia • Posttraumatic neuralgia • Peripheral neuropathy (diabetes, HIV) • Limb amputation • Herpetic neuralgia
Most Responsive Treatments	• Acetaminophen • Cold packs • Corticosteroids • Local anesthetic either topically or by infiltration • NSAIDs • Opioids • Tactile stimulation	• Corticosteroids • Intraspinal local anesthetic agent • NSAIDs • Opioids via any route	• Anticonvulsants • Corticosteroids • Neural blockade • NSAIDs • Opioids via any route • Tricyclic antidepressants

[1] Most postoperative patients experience A-delta and C fiber pain and respond best to narcotic of any route and NSAIDs.

[2] Segmental distribution follows a dermatome chart. This traces the pathway of sensation to its nerve root. A Dermatome Map is available through the ICSI Knowledge Products list in the "Support for Implementation" section of this guideline.

Opioid responsiveness: The following is a visualization of how different types of pain respond to opioids:

V* S N

most responsive *least responsive*

* Colic and muscle spasms may be less responsive to opioids. Respond best to antispasmodics, NSAIDs, benzodiazepines, baclofen.

Appendix B – Opioid Analgesics

Drug	Equianalgesic Potency*		Comments
	Oral	Parenteral	
Morphine	30 mg	10 mg	Long-acting forms may be given orally every 8 to 12 hours. Some long-acting dosage forms may be given rectally. Metabolites may cause myoclonus in patients with renal failure.
Hydromorphone	7.5 mg	1.5 mg	Potent opioid. Good agent for patients with renal dysfunction.
Oxycodone	20 mg		Long-acting form may be given orally/rectally every 8 to 12 hours.
Methadone	5 mg	**	Half-life > 24 hrs, so dosing adjustments should be made cautiously. Given every 6 to 8 hrs for pain management. May have role in management of neuropathic pain. Equalanalgesic ratios change with oral morphine doses > 100 mg/day – consult a specialist. Some N-methyl-D-asparatate (NMDA) antagonist activity.
Levorphanol	4 mg	2 mg	Potent opioid with some NMDA antagonist activity.
Meperidine	300 mg	75 mg	Metabolized to normeperidine, a CNS stimulant, which may cause seizures in patients with renal failure.
Fentanyl***	–	100 mcg	Short-acting. Available as transdermal patch (see conversion below) and buccal products.
Codeine	200 mg	130 mg	5%-10% of Caucasians lack the enzyme to metabolize codeine to morphine. May cause more nausea and constipation than other opioids. Profound narcosis has occurred in chronic renal failure patients.
Hydrocodone	30 mg		Often combined with non-opioid analgesics, which limits the total dose per day.
Oxymorphone	10 mg	1 mg	Oral administration with food or alcohol may result in excessive sedation.
Nalbuphine		10 mg	May precipitate withdrawal in opioid-dependent patients.
Butorphanol		2 mg	Available as nasal spray.
Pentazocine	50 mg	30 mg	Mixed agonist/antagonist. May precipitate withdrawal in opioid-dependent patients.
Buprenorphine		0.4 mg	Mixed agonist/antagonist. May precipitate withdrawal in opioid-dependent patients.
Propoxyphene	180-240 mg		Metabolized to norpropoxyphene, which may cause seizures.

(Derby, 1998; American Pain Society, Principles of Analgesic Use in the Treatment of Acute Pain and Cancer Pain, 5th Edition, 2003)

* This table reflects equianalgesic potencies, not recommended doses.
** Methadone: Confer with pain specialist before use.

***Note:**
Despite an FDA-issued Public Health Advisory in July 2005 regarding the appropriate and safe use of the transdermal system, death and life-threatening adverse events related to fentanyl overdose have occurred when the fentanyl patch was used to treat pain in opioid-naive patients and when opioid-tolerant patients have applied more patches than prescribed, changed the patch too frequently, and exposed the patch to a heat source. The fentanyl patch is only indicated for use in patients with persistent moderate to severe chronic pain who have been taking a regular, daily, around-the-clock narcotic pain medicine for longer than a week and are considered to be opioid-tolerant.

Patients must avoid exposing the patch to excessive heat as this promotes the release of fentanyl from the patch and increases the absorption of fentanyl through the skin, which can result in fatal overdose. Directions for prescribing and using the fentanyl patch must be followed exactly to prevent death or other serious side effects from fentanyl overdose.

Transdermal fentanyl is not appropriate for acute, unstable pain.

Appendix C – DSM-IV Diagnostic Criteria for Substance Dependence

A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

1) Tolerance, as defined by either of the following:
   (a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect
   (b) markedly diminished effect with continued use of the same amount of the substance
2) Withdrawal, as manifested by either of the following:
   (a) the characteristic withdrawal syndrome for the substance
   (b) the same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms
3) The substance is often taken in larger amounts over a longer period than was intended
4) There is a persistent desire or unsuccessful efforts to cut down on control substance use
5) A great deal of time is spent in activities necessary to obtain the substance (e.g., chain-smoking), to recover from its effects
6) Important social, occupational or recreational activities are given up or reduced because of substance use
7) The substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption)

American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Washington, DC: American Psychiatric Association, 1994.

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Brief Description of Evidence Grading

Individual research reports are assigned a letter indicating the class of report based on design type: A, B, C, D, M, R, X.

A full explanation of these designators is found in the Foreword of the guideline.

II. CONCLUSION GRADES

Key conclusions (as determined by the work group) are supported by a conclusion grading worksheet that summarizes the important studies pertaining to the conclusion. Individual studies are classed according to the system defined in the Foreword and are assigned a designator of +, -, or ø to reflect the study quality. Conclusion grades are determined by the work group based on the following definitions:

Grade I: The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of any significant doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large samples to have adequate statistical power.

Grade II: The evidence consists of results from studies of strong design for answering the question addressed, but there is some uncertainty attached to the conclusion because of inconsistencies among the results from the studies or because of minor doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the question addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

Grade III: The evidence consists of results from studies of strong design for answering the question addressed, but there is substantial uncertainty attached to the conclusion because of inconsistencies among the results from different studies or because of serious doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from a limited number of studies of weak design for answering the question addressed.

Grade Not Assignable: There is no evidence available that directly supports or refutes the conclusion.

The symbols **+**, **–**, **ø**, and **N/A** found on the conclusion grading worksheets are used to designate the quality of the primary research reports and systematic reviews:

+ indicates that the report or review has clearly addressed issues of inclusion/exclusion, bias, generalizability, and data collection and analysis;

– indicates that these issues have not been adequately addressed;

ø indicates that the report or review is neither exceptionally strong or exceptionally weak;

N/A indicates that the report is not a primary reference or a systematic review and therefore the quality has not been assessed.

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Conclusion Grading Worksheet A – Annotation #17 (Ketorolac)

Work Group's Conclusion: Ketorolac, either parenteral or oral, should be used for no more than 5 days; dose reduction is indicated in the elderly and in those with renal impairment.

Conclusion Grade: III

Author/Year	Design Type	Class	Quality +,–,0	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ *Work Group's Comments (italicized)*
Pearce et al. (1993)	Case Reports	D	**N/A**	-3 cases that occurred within 1 week at 2 hospitals in the community	-Case 1 – 58 year old patient given ketorolac (60 mg intramuscularly followed by 30 mg every 6 hours for 6 days, total dose of 750 mg) for pain following cholecystectomy; developed fever and confusion on day 6; died on day 9 -Case 2 – 46 year old patient given ketorolac (total dose of 1350 mg) for pain associated with chest tube; potassium levels were elevated at 11 days; at 16 days ketorolac was discontinued and potassium levels normalized -Case 3 – 53 year old patient given ketorolac (total dose 1140 mg) for pain associated with simple mastectomy; renal insufficiency with hyperkalemia at 10 days; electrolytes returned to baseline within 24 hours after discontinuing ketorolac; creatinine and serum urea nitrogen levels improved to normal range within 9 days	-Clinical conditions pre-existed in each patient that rendered them susceptible to the renal complications of NSAID use. Caution should be observed while using NSAIDs (including ketorolac) in patients whose renal function may be preserved through prostaglandin-mediated vasodilatory effects. The potent effect of ketorolac on prostaglandin synthesis must be emphasized.
Corelli & Gericke (1993)	Case Reports	D	**N/A**	-6 reports of possible ketorolac-induced renal insufficiency (defined as >30% increase in serum creatinine over baseline) -Included patients with renal insufficiency temporarily related to ketorolac administration, resolution of insufficiency after discontinuation of ketorolac, no other cause of insufficiency identified	-4 men, 2 women with mean age of 58 years -3 patients had major surgical procedure within 5 days of start of ketorolac therapy -Mean duration of therapy was 3 days (excluding one patient whose creatinine values were not monitored for 9 days) -Mean total dosage was 153 mg -One case of acute oliguric renal failure within 2 hours after single dose -Renal function returned to normal after an average of 2.3 days following the maximum measured creatinine value -All patients experienced a decrease in urine output; serum potassium values stayed within normal limits	-Although ketorolac may be advantageous for the short-term management of pain in patients intolerant of narcotic analgesics, it shares the adverse-effect profile of other NSAIDs including gastrointestinal ulceration, inhibition of platelet aggregation, alterations in hepatic function, and nephrotoxicity. -Short-term administration of ketorolac can be associated with reversible oliguric renal insufficiency; risk factors identified in this study include increased age, recent major surgery, underlying cardiovascular disease.

Author/Year	Design Type	Class	Quality +,–,ø	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ *Work Group's Comments (italicized)*
Murray & Watson (1993)	Case Report	D	**N/A**	-1 patient	-46 year old patient given ketorolac (60 mg intramuscular loading dose followed by 30 mg every 5 hours, total dose of 180 mg) for pain following uncomplicated shoulder surgery; ketorolac was discontinued on day 2 because of nausea; patient experienced complete transient renal failure (within 2 days) and subsequent serious gastrointestinal bleeding requiring transfusion (13 days post-operatively and 2 days after discharge); patient had also received vancomycin (1 gm intravenously every 12 hours – 2 doses total)	-Vancomycin in association with ketorolac may have an additive toxic effect. Ketorolac can cause acute oliguric renal failure in young, previously healthy patients when used in association with nephrotoxic agents. NOTE: patient was given Feldene pre-operatively which may have initiated gastric alteration
Steinberg & Tessier (1993)	Case Reports	D	**N/A**	-3 patients from 1 institution	-Case 1 – 76 year old given ketorolac (60 mg intramuscular loading dose then 30 mg every 6 hours for 5 days) for pain associated with rib fractures and pneumothorax; ketorolac was stopped due to heme-positive stools and decreasing hematocrit; duodenal ulcer identified with endoscopy -Case 2 – 83 year old patient given ketorolac (same dose as above for 3 days) for pain associated with hemicolectomy; gastrointestinal bleeding (source not defined) developed several days later -Case 3 – 63 year old patient with renal failure and occlusive vascular disease that resulted in above-knee amputation; given ketorolac (30 mg every 6 hours intramuscularly for 10 days) for stump pain; stopped ketorolac after gastrointestinal bleeding required transfusion of 3 units of packed cells; numerous gastric erosions observed with endoscopy	-Common factor was the use of relatively large doses of ketorolac (in view of patient weights of 60 kg, 55 kg, and 65 kg, respectively). -Gastrointestinal bleeding can occur with parenteral administration of NSAIDs.

Author/Year	Design Type	Class	Quality +,-,Ø	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ *Work Group's Comments (italicized)*
Strom et al. (1996)	Cohort	B	Ø	-Patients who received intramuscular or intravenous ketorolac at one of 35 hospitals; unexposed group received parenteral opiates; patients were matched by hospital, admitting service (medical vs surgical), and date of initiation of therapy -Course of treatment was from first dose through 3rd day after final dose (patients may have had >1 course – only one course of opiates was studied) -Data abstracted from medical records: demographics, previous illnesses, doses and duration of treatment, aspects of the hospital course, adverse events (classified as clinically serious if caused death, residual disability, prolonged hospitalization, or was life threatening)	-9,900 patients received 10,272 courses of ketorolac -10,247 patients received 10,247 courses of opiates -Gastrointestinal (GI) bleeding occurred in 4% of all ketorolac courses and 3.6% of all opiate courses (for clinically important GI bleeding the values were 2.1% and 1.9%, respectively; for clinically serious GI bleeding the values were 1.3% and 1.0%, respectively); the adjusted ORs were 1.3 (1.11-1.52) for all GI bleeding, 1.17 (0.95-1.44) for clinically important GI bleeding, and 1.44 (1.09-1.98) for clinically serious GI bleeding; fatal GI bleeding was rare with no difference between groups -Operative site bleeding occurred in 29.6% of ketorolac courses and 38.6% of opiate courses (OR=1.02; 0.95-1.10); clinically serious operative site bleeding occurred in 1.5% of ketorolac group and 1.8% of opiate group -Risk of GI or operative site bleeding increased with age in both groups (significant for ketorolac group p<0.02) -More GI bleeding in patients receiving higher doses of ketorolac; effect of dose was greater for clinically important or clinically serious GI bleeding -More operative site bleeding in patients receiving higher doses of ketorolac -Increased risk of GI bleeding as therapy was prolonged beyond 5 days; relationship not observed for operative site bleeding.	-Compared to use of opiates, use of ketorolac was associated with a small increased risk of GI bleeding. The risk was notably increased in the elderly, with use >5 days, and with higher dose. Use of ketorolac was also associated with a small increased risk of overall operative site bleeding but only in elderly patients or with higher-dose therapy NOTES: patients who received ketorolac may also have received opiates; patients who received opiates did not receive ketorolac; there were differences between groups in gender, age, and past medical history; ketorolac was more likely to be used in orthopedic surgery patients; opiates were more likely used in other types of surgery; ketorolac was more likely initiated in operating room, recovery room, or emergency department; opiates more likely initiated in ICU, procedure unit, or general medicine, surgical, or pediatric floor; ketorolac was more likely used intraoperatively or for chronic pain; opiates were more likely used preoperatively, for addiction relief, for relief of anxiety with dyspnea, and for obstetrical analgesia

Author/Year	Design Type	Class	Quality +, –, ø	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ *Work Group's Comments (italicized)*
Feldman et al. (1997)	Cohort	B	ø	-Patients – same as above except excluded long-term dialysis patients -Acute renal failure was defined by peak serum creatinine concentration 50% greater than baseline value and 1) an absolute increase of at least 44.2 μmol/L if baseline concentration was <132.6 μmol/L or 2) an absolute increase of at least 88.4 μmol/L if baseline concentration was ≥ 132.6 μmol/L; secondary definition required laboratory evidence plus notation in chart that acute renal failure had occurred during course of therapy with analgesic drug	-9,850 patients received 10,219 courses of ketorolac -10,145 patients received 10,145 courses of opiates -Greater history of chronic renal failures (p=0.001), papillary necrosis (p=0.002), and nephrotic syndrome (p=0.02) in opiate group -Acute renal failure occurred during 109 courses of ketorolac (1.07%) and 113 courses of opiates alone (1.11%) -Acute renal failure occurred more often in the presence of hypertension, chronic renal disease, cirrhosis, admission to ICU, cancer, concomitant use of aminoglycoside antibiotics, and medical admission (all p<0.01) -Risk for acute renal failure increased with age (p<0.01) -Ketorolac was not associated with acute renal failure except when analysis was focused on duration of therapy of greater than 5 days (p=0.03 compared to opiates)	-Overall incidence of acute renal failure after a course of analgesics was low, even in ill, hospitalized patients. -Overall incidence of renal failure among patients receiving parenteral ketorolac was similar to that among patients receiving opiates. With therapy lasting longer than 5 days, ketorolac may be associated with a higher incidence of acute renal failure than are opiates. -No clinically distinct subgroup was identified to be at particular risk for ketorolac nephrotoxicity.

Conclusion Grading Worksheet B – Annotation #17 (Meperidine)

Work Group's Conclusion: Meperidine is not considered a first-line opioid analgesic medication for acute pain syndromes. If used, dosing limitations are necessary to prevent central nervous system (CNS) excitatory toxicity from normeperidine accumulation, a metabolite of meperidine. Patients with impaired renal function and elderly individuals are at particularly high risk of CNS toxicity. Patients receiving meperidine should be monitored for symptoms and signs of CNS excitation.

Conclusion Grade: II

Author/Year	Design Type	Class	Quality (+,–,**0**)	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ *Work Group's Comments (italicized)*
Fong et al., 2006	Systematic Review	M	**0**	Lit search identified 6 studies comparing different opioid analgesics in terms of postop delirium and cognitive decline; Three observational studies were found that compared meperidine with other opioids (total n=878), with most patients > 70 years of age; for all studies, assessments of cognitive status were performed for at least 2 days post-op or until patient discharge; no meta-analysis due to lack of standardized outcome methods	All three studies depicted meperidine to be significantly associated with an increased incidence of postoperative delirium as compared to other opioid analgesics, including morphine, for elderly surgical patients	Compared to other opioids including morphine, meperidine is associated with a significantly increased risk of delirium in the post-operative period for elderly surgical patients; Limitation: the three studies reviewed did not analyze the relative level of analgesia between patient groups (level of pain is also a risk factor for delirium)

Author/Year	Design Type	Class	Quality (+, –, **0**)	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ *Work Group's Comments (italicized)*
Seifert and Kennedy, 2004	Case series (retrospective medical record review)	D	**0**	Patients > 18 yrs old treated with meperidine and identified as at high risk of toxic adverse events, defined as patients with impaired renal function (creatinine clearance < 50 ml/min), those receiving patient-controlled analgesia (PCA), and those receiving daily dose totals of > 200 mg for multiple days; a total of 141 patients who received meperidine were identified as high-risk and included in the chart review	Median daily dose of meperidine was 167 mg; median duration of treatment was 3 days; cumulative dose median was 490 mg Adverse drug reactions (ADRs) occurred in 14% of patients receiving meperidine; patients with ADRs were significantly older than those who did not have ADRs (58.5 years vs. 46.4 years respectively, p=0.004); median hospital stay was 9.45 days for patients with ADRs vs. 4.50 days for non-ADR patients (p<0.005); more patients with ADRs received concomitant benzodiazepines (65% with ADRs, 4.1% without ADRs received benzodiazepines, p< 0.0001); the difference in cumulative doses (for patients receiving PCA) between patients with ADRs and no ADRs was significant (p=0.0157), higher for those with ADRs For patients with renal impairment, 20% of these patients experienced ADRs, and 29.4% of patients with renal impairment and who are also using PCA developed ADRs; patients with renal impairment using PCA showed a non-significant difference in cumulative dose and duration of meperidine treatment between ADR and non-ADR groups ; for patients without renal impairment using PCA, median cumulative dose was significantly different between ADR and non-ADR groups (1040 mg and 490 mg respectively, p=0.0103) but duration in days of meperidine treatment was not significantly different for the two groups (4.0 days in the ADR group and 3.0 days in the non-ADR group, p=0.1012)	Patients using PCA are at particularly increased risk for ADRs associated with meperidine treatment; ADRs also associated with increasing age, concomitant benzodiazepine treatment, increasing cumulative meperidine dose, and a longer length of hospital stay Limitation: difficult to distinguish true meperidine ADRs from other causes such as benzodiazepine treatment; there also may be bias in reporting adverse events (bias toward underreporting was suggested) Meperidine treatment should be severely curtailed, givent that meperidine has no additional benefit compared with other opioid analgesics and has more potential for serious ADRs

Author/Year	Design Type	Class	Quality (+, –, **0**)	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ *Work Group's Comments (italicized)*
Latta et al., 2002	Narrative review	R	**0**	Narrative review of studies on meperidine, including metabolism, pharmacokinetics, pharmacodynamics (including analgesia and smooth muscle effects), respiratory and CNS effects.	Half-life for toxic metabolite (normeperidine) can range from 14-48 hours (meperidine half-life about 3.6 hours) which can lead to accumulations of normeperidine and increased risk of CNS toxicity (anxiety, hyperreflexia, myoclonus, mood changes, and seizures); patients taking medications that induce hepatic enzymes (increasing synthesis of normeperidine) or impaired renal function (decreasing excretion of normeperidine) are at higher risk of normeperidine accumulation and toxicity; respiratory depressant effect of meperidine is higher than that of morphine;	Preferential use of meperidine lacks scientific support; given CNS toxicity, other drugs must be preferred, although meperidine may have some utility for short-duration procedures given limited duration of action, although fentanyl is an alternative for this application as well Given the pro-convulsant activity, potential for CNS excitation, the tendency for increased drug-seeking behaviors, negative effect on mood, and its anticholinergic effects, meperidine is not an optimal analgesic; but may have a narrow place, if any, for interventional pain from procedures; analgesic effect of meperidine seems to be less for more severe pain Time line for meperidine side effects (length of treatment, amount consumed) may be unpredictable Meperidine is considered a negative marker for many governmental, professional, and accreditation organizations

Author/Year	Design Type	Class	Quality (+, –, **0**)	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ *Work Group's Comments (italicized)*
Simopoulos et al., 2002	Case series (retrospective medical record review)	D	**0**	Retrospective review of 355 medical records of patients who received IV patient-controlled analgesia (PCA) with meperidine; patients were divided into 4 groups as follows: -- Group 1 (low dose, asymptomatic); 291 patients using less than 600 mg/day meperidine, no CNS excitatory symptoms -- Group 2 (high dose, asymptomatic); 51 patients using > 600 mg/day meperidine, no CNS excitatory symptoms -- Group 3 (high-dose, symptomatic); 7 patients using > 600 mg/day, had CNS excitatory symptoms; -- Group 4 (other); 6 patients with CNS excitatory symptoms, considered idiosyncratic or confounded by other factors	Overall incidence of CNS toxic reactions was 2%, but rises significantly to 12% if > 600 mg/day IV PCA meperidine used Group 2 received mean dose of 13.3 mg/kg per day, mean duration 1.7 days; Group 3 received mean dose of 16.9 mg/kg per day, mean duration 2.2 days; there were no significant differences in terms of age, gender, and renal function between groups 2 and 3. Mean dose rate of group 3 differed significantly from that of group 2 ($p < 0.05$); duration of IV PCA meperidine use did not differ significantly between the two groups; Patients receiving less than 10 mg/kg per day of meperidine unlikely to experience CNS excitatory adverse events In cases where CNS toxic reactions occurred, it was manifest after approximately 2 days in all cases	10 mg/kg per day proposed as maximum dose of meperidine for a 3 day period to obviate CNS excitation from normeperidine; data to allow comment on longer durations is limited since most devices are discontinued between day 2 or 3 of treatment Daily evaluation of each patient using IV PCA meperidine should include determination of daily (24 hour) dose and the patient should be observed for signs/symptoms of CNS excitation.

This section provides resources, strategies and measurement specifications for use in closing the gap between current clinical practice and the recommendations set forth in the guideline.

The subdivisions of this section are:

- Priority Aims and Suggested Measures
  - Measurement Specifications
- Key Implementation Recommendations
- Knowledge Resources
- Resources Available

Priority Aims and Suggested Measures

1. Improve the assessment and reassessment of patients of all ages with acute pain by determining the mechanism and intensity of pain. *(Annotations #3, 10)*

   Possible measures of accomplishing this aim:

   a. (outpatient and inpatient): Percentage of patients with acute pain of all ages with documentation of an initial pain assessment that includes the description, the mechanism, and the intensity of the pain. (See Appendix A for clinical examples.)

   b. (inpatient): Percentage of patients with acute pain (all ages) with documentation of pain rating upon admission, once a shift, and at discharge during a hospital stay.

   c. (inpatient): Percentage of patients with acute pain (all ages) with discharge plan identifying patient's continuing need for pain management and orders to meet these needs.

   d. (outpatient and inpatient): Percentage of patients (all ages) reassessed for acute pain who indicate a pain level not meeting comfort goal that resulted in treatment adjustment (pharmacologic or non-pharmacologic).

2. Improve the treatment of patients (all ages) with acute pain to include appropriate selection of pharmacologic and/or non-pharmacologic interventions. *(Annotation #17)*

   Possible measures of accomplishing this aim:

   a. (outpatient and inpatient): Percentage of patients with persistent acute pain (all ages) not meeting comfort goal who are offered an alternative or additional pharmacologic and/or non-pharmacologic treatment.

   b. (outpatient and inpatient): Percentage of patients with acute pain (all ages) with a diagnosis consistent with acute, uncontrolled neuropathic pain (see Appendix A for clinical examples) who are given a trial of either anticonvulsants or tricyclic antidepressants.

   c. (inpatient): Percentage of inpatients with acute pain (all ages) prescribed an opioid who are assessed for symptoms secondary to analgesia, e.g., decreased mental status, confusion, delirium, nausea, vomiting (within 30 minutes after parenteral administration or within one hour after oral administration).

3. Increase the involvement of all patients with acute pain of all ages, or their caregivers, in the management of their pain symptoms. *(Annotations #3, 17)*

   Possible measures of accomplishing this aim:

   a. (outpatient and inpatient): Percentage of patients with acute pain (all ages) with documentation of patient's goal for pain.

   b. (outpatient and inpatient): Percentage of patients with acute pain (all ages) with documentation of receiving education regarding pain and the management of pain.

Measurement Specifications

Possible Success Measurement #1d

Percentage of patients of all ages reassessed for acute pain who indicate a pain level not meeting comfort goal that resulted in treatment adjustment (pharmacologic or non-pharmacologic).

Population Definition

Patients of all ages with acute pain who had a clinic visit during the month in question.

Data of Interest

$$\frac{\text{\# of records with a completed reassessment of the patient with acute pain that includes current pain intensity not meeting the patient's comfort goal.}}{\text{\# of patients who present with acute pain who had a clinic visit during the month in question.}}$$

Numerator/Denominator Definitions

Numerator: Those medical records that are reviewed that have evidence of a completed reassessment of the patient's acute pain that includes a pain intensity numerical score or narrative description, such as "pain unrelieved," "pain uncontrolled."

Denominator: Patients of all ages with acute pain.

Method/Source of Data Collection

Patients within the preceding month can be randomly sampled to produce a list of at least 20 records for review. Selected records are audited to see:

- If a reassessment of the patient's acute pain was completed and documented;

  AND

- If there is documentation of a numerical pain intensity score or narrative description indicating that the current intervention is not meeting patient's current comfort goal (e.g., "pain unrelieved," "pain uncontrolled").

Time Frame Pertaining to Data Collection

Data can be collected monthly.

Key Implementation Recommendations

The following system changes were identified by the guideline work group as key strategies for health care systems to incorporate in support of the implementation of this guideline.

1. All patients presenting with a complaint of acute pain are assessed for origin of pain through physical examination and detailed history.
2. An individualized care plan is developed for each patient to ensure adequate pain control while monitoring for signs of psychological and/or physical dependence.
3. Establish a protocol specific for PCA pump monitoring (see Annotation #17).

Resources Available

ICSI has a wide variety of knowledge resources that are ***only*** available to ICSI members (these are indicated with an asterisk in far left-hand column of the Resources Available table). In addition to the resources listed in the table, ICSI members have access to a broad range of materials including tool kits on CQI processes and Rapid Cycling that can be helpful. To obtain copies of these or other Knowledge Resources, go to http://www.icsi.org/knowledge. To access these materials on the Web site you must be logged in as an ICSI member.

The resources in the table on the next page that are not reserved for ICSI members are available to the public free-of-charge.

Resources Available

*	Author/Organization	Title/Description	Audience	Web Sites/Order Information
	American Academy of Family Physicians	Pain Control After Surgery: Pain Medicines Document provides answers to common questions regarding pain control following surgery.	Patients and Families	http://familydoctor.org/259.xml
	American Academy of Pain Medicine	American Academy of Pain Medicine: Founded in 1983 and has become the primary organization for physicians practicing the specialty of pain medicine in the U.S. The site includes a patient portal.	Patients and Families; Health Care Providers	http://www.painmed.org
	American Geriatric Society (AGS) Foundation for Health in Aging.The Foundation is a national non-profit organization established in 1999 by The American Geriatrics Society. The foundation aims to build a bridge between the research and practice of geriatrics and the public, and to advocate on behalf of older adults and their special health care needs. The Foundation's Web site is designed to provide public education and information.	Persistent Pain: AGS Expert Panel, The Management of Persistent Pain in Older Person The document addresses common questions regarding tolerance and side effects of medication. Alternatives to pain medication are identified, as well as tools for discussing pain with health care providers.	Patients and Families	http://www.healthinaging.org/public_education/pef/persistent_pain.php
	American Pain Foundation A comprehensive site that provides resources for patients and families that includes, but is not limited to, pain information library, various Web site links, and downloadable publications.	Pain Resource Guide: Getting the Help You Need Designed to help the patients or family members take charge of their pain care. It provides important information about pain and tips to assist the patient in getting quality pain care. Included is a page to list the health care team and record questions and concerns during appointments.	Patients and Families	http://www.painfoundation.org/page.asp?file=Publications/Index.htm

* Available to ICSI members only.

*	Author/Organization	Title/Description	Audience	Web Sites/Order Information
	American Pain Foundation; A comprehensive site that provides resources for patients and families that includes, but is not limited to, pain information library, various Web site links, and downloadable publications.	Treatment Options: A Guide for People Living with Pain; Written and reviewed by leading pain specialists, the guide provides credible, comprehensive information about medications, psychosocial interventions, complementary approaches, rehabilitation therapies, surgical interventions and more.	Patients and Families	http://www.painfoundation.org/page.asp?file=Publications/Index.htm
	American Pain Society	American Pain Society: A multidisciplinary scientific and professional society. CEs available. Several position statements available including pediatric chronic pain, use of opioids, and preventing abuse of pain meds.	Patients and Families; Health Care Providers	Patients: http://www.ampainsoc.org/advocacy/promoting.htm Professionals: http://www.ampainsoc.org/
	American Society for Pain Management Nurses	American Society for Pain Management Nurses: To advance and promote optimal nursing care for people affected by pain. Position statement on treating pain for patients with addictive disease.	Health Care Providers	http://www.aspmn.org/
	American Society of Anesthesiologists	The Management of Pain; Web page discusses various aspects of pain treatment including specialists, pain treatments, and other options.	Patient and Families	http://www.asahq.org/patientEducation/managepain.htm
*	ICSI	Patient Education PDF Communicating About Your Pain, by Mayo Clinic (Brochure)	Health Care Providers	http://www.icsi.org/guidelines_and_more/patient_education_resources/musculo-skeletal_disorders/
*	ICSI	Patient Education PDF Controlling Acute Pain, by Park Nicollet Health Services (brochure)	Health Care Providers	http://www.icsi.org/guidelines_and_more/patient_education_resources/musculo-skeletal_disorders/
*	ICSI	Process Improvement Reports (PIRs): Pain Management Focus Group Report (#7) A written summary report of the Pain Management Focus Group.	Health Care Providers	http://www.icsi.org/patient_focus_group_reports/pain_management_focus_group_report__process_improvement_report__7_.html

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*	Author/Organization	Title/Description	Audience	Web Sites/Order Information
*	ICSI	Toolkit: Assessment and Management of Acute Pain Toolkit; The toolkit includes a variety of pain assessment tools and questionnaires, pain management guide with assessment and interventions.	Health Care Providers	http://www.icsi.org/improvement_resources/knowledge_resources/tools/acute_pain__assessment_and_management_of.html
	KidsHealth The Nemours Foundation KidsHealth is the largest and most-visited site on the Web providing doctor-approved health information about children from before birth through adolescence.	Why Do I Have Pain? An article written for children addressing the reason for pain.	Patients and Families (parent/child)	http://www.kidshealth.org/kid/talk/qa/pain.html
	Krames	Krames (Keyword: Pain) A health information publisher providing evidence-based, peer-reviewed patient education materials in print and electronic formats that are available online or by mail. A variety of educational materials are available on pain. These include: • Managing Pain Booklet • Understanding Your Pain Booklet	Patients and Families; Health Care Providers	http://www.krames.com/ 110 Grundy Lane San Bruno, CA 94066-3030 (800)333-3032
	Mayo Clinic	This Web site provides information on current topics in medicine including pain. It also provides the opportunity to ask questions to a Mayo specialist.	Patients and Families; Health Care Providers	http://www.mayoclinic.com/

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*	Author/Organization	Title/Description	Audience	Web Sites/Order Information
	Patrick McGrath and G. Allen Finley G. Allen Finley, MD, FRCPC, and Judith Ritchie, RN, PhD Pediatric Pain: Science Helping Children; Izaak Walton Killam Children's Hospital and Dalhousie University; Halifax, Nova Scotia, Canada.	A booklet written to teach parents about pain in children and to help them to ask for better care.	Patients and Families (parent/child)	http://pediatric-pain.ca/ppga/ppga.html
	Debra K. Weiner, MD National Pain Foundation; The National Pain Foundation is a non-profit organization established in 1998 to advance functional recovery of persons in pain through information, education and support. The Web site provides information and resources that are presented in an interactive way that encourages patients to take an active role in the management of their chronic pain.	Pain in Older Adults; The resource addresses common myths and misperceptions regarding pain in older adults. The Web site provides additional information and support for persons with pain.	Patients and Families	http://nationalpainfoundation.org/MyTreatment/News_Pain-AndTheOlderAdult.asp

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