HHS Public Access

Author manuscript

*Am J Nurs*. Author manuscript; available in PMC 2015 July 23.

Published in final edited form as:

*Am J Nurs*. 2011 March ; 111(3): 34–45. doi:10.1097/10.1097/01.NAJ.0000395239.60981.2f.

# The Use of Algorithms in Assessing and Managing Persistent Pain in Older Adults

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## Abstract

As the population of the U. S. ages, nurses will care for increasing numbers of older adults, most of whom suffer from at least one chronic illness. Persistent pain associated with many chronic illnesses is of concern because of its detrimental effects on functioning and quality of life. Nurses play a primary role in ensuring that persistent pain is effectively managed and optimal functioning maintained. Successful pain management depends on comprehensive assessment skills, in-depth knowledge of evidence-based pharmacologic and non-pharmacologic treatment strategies appropriate for older adults, continuous re-assessment, and sound decision making. Algorithms developed from evidence-based clinical practice guidelines are tools that can support and enhance nurses' efforts to assess and manage persistent pain experienced by older adults. This paper introduces the reader to the use of algorithms to guide pain assessment and management and illustrates their use in a case study.

### Keywords

pain; older adults; algorithm; clinical decision-making; nursing judgment

According to the Centers for Disease Control (CDC), average life expectancy in the U. S. has increased from 68.2 to 77.7 years in the past 50 years (CDC, 1999; 2009 ). The proportion of citizens over the age of 65 is on the rise and is predicted to comprise approximately 20% of the population by 2030, representing 71 million people (CDC and the Merk Company Foundation, 2007). As a consequence of the aging of America, nurses will care for increasing numbers of older adults in all health care settings, 80% of whom suffer from at least one chronic illness (CDC and the Merk Company Foundation, 2007).

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Persistent pain associated with chronic illness in the older adult is of particular concern because of its detrimental effects on functioning and quality of life. Research indicates that there is a high prevalence of persistent pain among both community-dwelling older adults and residents of nursing homes (American Geriatrics Society [AGS], 2009; McCarthy, Bigal, Katz, Derby, & Lipton, 2009; Won et al., 2004). Pain associated with osteoarthritis in the upper extremities (Zhang et al., 2002), spine (Weiner et al., 2003), and lower extremities (Jinks, Jordan, & Croft, 2007; Dawson et al., 2004) causes significant functional decline in older adults. A progressive weakening in muscle strength and physical performance has been shown to occur as pain severity increases in persons over 80 who experience daily pain (Onder, Cesari, & Russo, 2006). Older adults who experience persistent pain also have increased risk of falls independent of chronic illness and associated physical changes (Leveille et al., 2009). This is significant because falls are among the leading causes of death and disability in the older population (Gorina, Hoyert, Lentzner, & Goulding, 2005; World Health Organization, 2010). Since nurses spend more time caring for older adults in both the community and residential settings than other healthcare professionals, they play a pivotal role as advocates to ensure that pain is effectively managed.

Success of nurses' efforts to manage pain depends on comprehensive assessment skills, in-depth knowledge of evidence-based pharmacologic and non-pharmacologic treatment strategies appropriate for older adults, continuous re-assessment, and sound decision making. Basic nursing programs, however, often do not adequately prepare nurses to care for the geriatric population or apply best evidence to their practice (Institute of Medicine [IOM], 2008; McConnell et al., 2009).

Algorithms developed from evidence-based clinical practice guidelines (CPGs) such as those published by the American Geriatrics Society (AGS) (2009) and the American Medical Directors Association (AMDA) (2009) are tools that can support and enhance nurses ' efforts to assess and manage persistent pain in older adults. Although algorithms are used by both physicians and nurses as aids to clinical decision making (Hadorn, 1995; Society for Medical Decision Making, 1992 ), more extensive use may facilitate the application of best research evidence to practice.

Historically nurses have often used protocols and procedures to guide care. More recently, clinical pathways have been used by nurses to operationalize guidelines or protocols (Miller & Kearney, 2004). Algorithms add a more complex "if – then" component to the guideline or protocol in a way that is consistent with the focus on critical thinking in nursing today.

The purpose of this article is to describe what algorithms are as well as the advantages and potential drawbacks associated with their use in clinical practice. Algorithms that focus on pain assessment and treatment with opioids will be introduced. Their use will be demonstrated through a case study of an older adult who experiences persistent pain.

## Algorithm definition

An algorithm is a step-by-step formula or set of rules for solving a problem (Venes, 2005). It is a schematic representation of the decision making process composed of flow diagrams with branching pathways that lead to some desired outcome (Hadorn, 1995). Algorithmic

decision making requires the nurse to evaluate a patient's condition using a set of questions with 'yes' or 'no' answers. A 'yes' answer leads to one branch of the decision tree, a 'no' answer to another. The process leads to a recommended action (see Figure 1).

In health care, algorithms provide one strategy for translating evidence-based CPGs into practice (Du Pen et al., 2000; Hadorn, 1995; Siddall & Middleton, 2006). CPGs are derived from rigorous systematic reviews of the current literature. They synthesize and transform scientific evidence and expert opinion into recommendations for best practice. They assist practitioners and patients to make decisions about appropriate health care for specific clinical circumstances (Institute of Medicine, 1990, p. 38). Algorithms summarize CPGs using a step-by-step, user-friendly methodology that enhances the nurse's ability to make sound clinical decisions based on best evidence.

## Advantages to the use of algorithms

Algorithms are visual roadmaps that nurses can use to guide their decision making when planning and evaluating care. They direct both assessment and management of a clinical problem and define the endpoint of the decision making process. Although algorithms make explicit the steps involved in making a decision, it is not a rote process. Nurses still require sound critical thinking and assessment skills to implement the algorithm in a safe and efficient manner.

Nurses make decisions every day in clinical practice, the consequences of which directly affect outcomes of care. Because algorithms clearly illustrate the flow of thinking in a logical, step-by-step approach, they can be used to teach and refine nurses' skills in clinical decision making. They help to identify gaps in assessment as well as errors in logical thinking about a clinical problem. Algorithms are especially valuable tools for novice nurses who may lack experience and confidence in their decision making. A well crafted algorithm can create more efficiency in care planning, cue nurses to follow up on critical monitoring, and help maximize confidence in the decisions they make. Algorithms structure nurses' thinking and help prevent flawed decisions that have the potential to negatively affect outcomes.

The current focus on evidence-based practice requires nurses to be knowledgeable of the scientific basis for their interventions and have the ability to apply evidence to practice. However, many nurses are not adequately prepared to locate, interpret, and apply research findings (McConnell et al., 2009). Algorithms derived from CPGs that define current best practice serve as educational tools to address these deficits. The flowchart format of algorithms has been shown to be effective in promoting learning and adherence to best practice (Hadorn, 1995; Society for Medical Decision Making Committee on Standardization of Clinical Algorithms, 1992).

Finally, algorithms provide models for further research and development. Recommendations made at various decision points in the algorithm are supported by differing levels of empirical (i.e., research) evidence. For example, an algorithm derived from the CPGs for management of persistent pain in older adults developed by the AGS (2002;2009) advises that non-steroidal anti-inflammatory drugs (NSAIDs) be prescribed only rarely, and with

extreme caution, in highly selected individuals. There is strong support for this recommendation obtained from randomized controlled trials (AGS, 2009). On the other hand, empirical support for the use of non-pharmacologic methods for management of persistent pain (e.g., heat, cold, acupuncture, and transcutaneous electrical nerve stimulation) is much weaker, based on expert opinion or clinical experience (AGS, 2002). This underscores a need for further research investigating the effectiveness of non-pharmacologic methods often used for pain relief without a sound scientific rationale.

## Drawbacks to the use of algorithms

Although there are many advantages to using algorithms to help assess and manage pain, potential problems associated with them warrant discussion. Critics of algorithms argue that they are rigid and do not take into account all the factors such as comorbidities, medical and social histories, and potential drug-drug interaction that must be considered in making sound clinical decisions about treatment. It is not feasible to build all possible contingencies into an algorithm nor is that the intent. It is also important to emphasize that, while algorithms are excellent guides for clinical decision making, they are not substitutes for careful observation and critical thinking. Algorithms are used as aids to decision making, not mandates. Evidence-based practice also requires that personal preferences of patients be incorporated into the plan of care (Melnyk & Fineout-Overholt, 2006). Nurses must be flexible in their application to accommodate individual differences among patients as well as personal preferences and goals.

Algorithms represent the best evidence currently available to guide practice, although not all recommendations are validated with high level empirical evidence. Expert opinion on best practice supplements research where strong evidence is lacking. Algorithms are designed to cover the clinical contingencies for the majority of patients with a given condition.

## Algorithms to assess and manage pain in older adults

Examples of two algorithms, one focusing on pain assessment and the other on opioid therapy, are presented in Figures 1 and 2. They are two of a series of algorithms that were developed for a NIH-funded study to evaluate the efficacy of pain management algorithms for assessing and treating pain in older adults residing in nursing homes (Ersek, DuPen, & Herr, 2005). The complete collection includes several algorithms, each of which addresses a major component of pain management including: general pain assessment for persons who are able to self-report, pain assessment for persons who are not able to self-report, analgesics (i.e., acetaminophen, NSAIDs, opioids, and adjuvant medications), and assessment and management of analgesic-related side effects (e.g., constipation, sedation, nausea/vomiting). The algorithms are compiled in a reference book from which the nurse chooses the appropriate algorithms to guide clinical decision making based on the specific situation.

The algorithms were derived from evidence-based clinical practice guidelines developed by the AGS (2002, 2009) and AMDA (2009). A panel of experts in geriatrics and pain reviewed the algorithms and the final drafts were revised based on their critiques. Initially developed in 2005, the algorithms were most recently updated in 2009. They are designed to assist nurses to assess and manage pain using methods supported by the current best

research evidence. The following case study illustrates the use of the algorithms with an older adult experiencing persistent pain.

## Case study

Helen is an 80-year old resident of Sunset Hills Nursing Home. She suffers from several chronic illnesses, among them chronic renal failure, hypertension, osteoporosis, and degenerative joint disease affecting several joints, particularly her right hip and both knees. Over the past week, Helen has frequently reported pain. Prior to this, she had been able to ambulate independently using a walker. She now spends most of her time in a wheelchair and requires moderate assistance with transfers. The nurse caring for Helen recognizes that pain is a significant factor limiting her mobility. The nurse is concerned about her decreased level of functioning but is uncertain what treatment will be most effective in helping her regain her previous level of independence. The first critical step toward managing Helen's pain is a thorough pain assessment. The nurse refers to the algorithm in Figure 1 to guide the assessment, beginning with the oval in the upper left hand corner of the diagram.

## Pain assessment algorithm

*Can the resident self-report?* Yes.

As directed by the algorithm, the nurse first determines that Helen is alert and oriented and able to report her pain. Her nurse would have been directed to an assessment algorithm for non-verbal older adults if Helen was unable to self-report. The algorithm instructs the nurse to then conduct an assessment of Helen's pain.

*Is the resident currently experiencing any type of pain?* Yes.

From patient interview and physical examination, the nurse determines that Helen is experiencing moderate to severe non-radiating left knee pain which is typically is mild to moderate and has been tolerable in the past. However, Helen reports increased pain over the past week and rates the pain at 6 on a scale of 0–10. With further questioning, the nurse finds that, although Helen's current pain is usually 6, it is worse in the morning, often 7–8/10. The pain is is exacerbated with excessive movement and prolonged periods of immobility. Helen is very distressed by the effect the pain has had on her ability to take care of basic needs such as showering and walking to meals. She states that she is depressed because the acetaminophen she has been taking is no longer effectively relieving her pain.

*Is the pain a result of a treatable etiology?* No.

The nurse talks with Helen who states that she has not fallen or experienced any trauma in the last 2 weeks. Helen also states that the location and quality of the pain is unchanged from her chronic pain, only the intensity seems to be worsening. The nurse conducts a physical examination to rule out a new source of pain. The physical examination findings are consistent with Helen's known history and a review of the medical record (x-ray reports, physician notes) reveals no evidence that Helen's pain results from a new or treatable source. Aware of her past medical history, the nurse concludes that the pain is the result of osteoarthritis, a chronic progressive degenerative disorder of the joints. Although Helen

receives medications for osteoporosis and restorative therapy to slow the functional impact of osteoarthritis, neither condition is curable.

Following the steps outlined in the algorithm, the nurse then proceeds to further evaluate Helen's pain. This step is crucial in that the information gleaned from a systematic assessment helps determine the treatment regimen, particularly appropriate analgesics.

*Conduct pain character assessment. Is the pain nociceptive, neuropathic, or a combination of both types?* Nociceptive

The assessment algorithm directs the nurse to determine the type of pain Helen is experiencing. This information is key to identification of the source of pain as well as appropriate treatment. Nociceptive pain, caused by damage to somatic (e.g., bones, muscle) or visceral (e.g., bladder, lungs) tissue, is treated differently than neuropathic pain, caused by damage to the peripheral or central nervous system. See Table 1 for a comparison of nociceptive and neuropathic pain. Helen describes the pain as a deep ache in her knees. She denies burning, numbness, tingling, or shooting pain. Based on its character and location, the nurse determines that Helen's pain is nociceptive, caused by the arthritis in her knees. Depending on the intensity of the pain, the nurse will be directed to either the acetaminophen algorithm or the opioid algorithm.

## Opioid algorithm

The assessment algorithm next directs the nurses to the appropriate algorithm for management of the pain. Since Helen is experiencing nociceptive pain that she rates as moderate to severe, the nurse is referred to the opioid algorithm which appears in Figure 2. Helen is already taking up to three grams of acetaminophen a day without satisfactory pain relief. Since Helen rates her pain as >4/10, is on an optimized acetaminophen regimen, and has experienced decreased function due to pain, the nurse determines that she may require opioids to achieve effective pain relief. The nurse continues to the next step of the algorithm.

*Has resident been tried on topical analgesics?* No.

Helen has not yet been tried on a trial of topical medications and the regional quality of Helen's pain may lend itself well to that therapy. The nurse obtains an order for a trial of diclofenac 1% gel to be applied to both knees and lower back three times a day. The nociceptive character of the pain and the regional location of the pain make topical NSAIDs an appropriate choice. There is good evidence of the efficacy of topical NSAIDs in the. short term (McCleane, 2008; Agency for Health Policy and Research, 2009; Heyneman, Lawless-Liday, & Wall, 2000) although long term efficacy for these agents has not been established (Lin, Zhang, Dones, & Doherty, 2004). Finally, reduction in side effects with topical analgesics versus systemic analgesics and the tendency of systemic analgesics to interact with other systemic drugs in the elderly make topical administration an advantage in this population (Agency for Health Policy and Research, 2009; McCleane, 2008).

This step points outs the varying strength of evidence for some elements of the algorithm. Several topical agents are used for pain, including lidocaine, capsaicin, and NSAID preparations. Strong empirical evidence supporting the use of topical analgesic agents is

lacking, particularly for non-neuropathic pain (AGS, 2009). However, they are recommended as an initial analgesic strategy in the algorithm because of their low toxicity compared to most oral and parenteral analgesics and their lack of drug interactions. Topical diclofenac and topical ibuprofen are the most widely studied of the topical NSAIDs (Agency for Health Policy and Research, 2009). Future research is needed to clarify the proper role of these agents in managing pain.

Helen's order for diclofenac gel is faxed to the institution's contract pharmacy but unfortunately the agent is not on the pharmacy's preferred formulary. Subsequently, the recommendation cannot be acted on. This barrier points out the need for critical thinking and flexibility in applying the algorithm. Other contingencies that may require adjustments in applying the algorithm are drug allergies and a prior trial of a medication that resulted in intolerable side effects or inadequate analgesia. In this circumstance, the nurse asks the consulting pharmacist to investigate alternatives.

*Is the resident currently taking opioids?* No.

Helen's pain is moderate to severe. Since she has not recently taken regular doses of opioids, the algorithm advises beginning with a short-acting opioid (SAO). The use of SAOs is suggested because they can be titrated for pain relief more rapidly and safely than long-acting opioids (LAO)(Fine, Mahajan, & McPhearson, 2009). Also, should side effects occur with the SAO, they can be more quickly managed than those associated with LAOs. For this reason, LOAs such as fentanyl patches and oxycodone extended release should not be used initially in older adults who have not received narcotics for a week or more. Helen's chronic renal failure presents another rationale for starting with the shorter half life drugs to minimize toxicity.

After completing a thorough assessment, the nurse uses (Situation-Background-Assessment-Recommendation) SBAR steps when consulting with the physician about Helen's pain to assure that information is clearly and completely communicated (Haig, Sutton, & Whittington, 2006). In describing the situation that prompted the call to the physician, the nurse reports that Helen is experiencing worsening and unrelieved pain in her knees. The physician is also provided background information, including Helen's medical history and pain medications currently prescribed but ineffective in relieving pain. The nurse also reports her pain assessment data along with the recommendation that a PRN SAO be added to Helen's medication regimen.

The nurse anticipates that the physician may be opposed or reluctant to prescribe an opioid for Helen's pain. Persistent pain in older adults is often undertreated for fears of over-sedation, cognitive impairment, and addiction (Kaasalainen et al., 2007; Weiner & Rudy, 2002). Based on knowledge of the current research evidence, the nurse explains the rationale for suggesting an opioid. After a discussion of the pros and cons of the use of opioids and reassured by the nurse's knowledge of the pain literature, the provider orders oxycodone 2.5 mg orally every 4–6 hours as needed (PRN) for pain (AGS, 2009). The physician also requests that the nurse re-evaluate Helen's pain level and side effects with a report back by fax in 72 hours.

Does the resident have persistent unacceptable side effects? No

Following initiation of new medications for pain, the algorithm alerts the nurse to monitor for side effects. The nurse requested an order for a stool softener and a stimulant laxative when the order for the opioid was obtained, knowing that constipation is a common side effect. Over the initial 72 hours, Helen was given PRN oxycodone 2.5 mg daily in the early morning to help her cope with increased pain when she first gets out of bed. She experienced mild drowsiness with the first dose of oxycodone, but not with subsequent doses. Helen maintain edher regular pattern of a daily bowel movement.

Is the pain controlled? No.

The next step in the algorithm occurs along with monitoring for side effects. Successful therapy depends on balancing pain relief with analgesic side effects. At times, immediate and severe side effects such as nausea and vomiting will require a change in treatment before the healthcare team is able to determine if the medication is effective. At other times, side effects occur and can be managed, allowing sufficient opportunity to assess the effectiveness of the medication on pain relief.

When questioned, Helen indicated that her usual pain decreased to 3/10 with the PRN oxycodone but her morning pain persists at 5/10. Again referring to the algorithm, the nurse reassesses the pain, including its pattern. Helen's pain is fairly constant with periods of exacerbation in the morning. This pattern is generally best managed with round-the-clock dosing with her SAO for the constant pain plus a PRN dose for the episodes of worsened pain. Because the pain exacerbation occurs regularly and predictably, the short-acting dose should be scheduled rather than ordered PRN to prevent the morning pain. The nurse contacted the physician by fax with the updated pain assessment along with suggested recommendations. Together they elected to schedule a 5 mg oxycodone dose daily in the early morning, and trial a scheduled dose of 2.5 mg midday and at bedtime. After two days on this new regimen, Helen's pain usual pain is 3/10 and the morning pain has decreased to 2–3/10. She is a bit sleepy after the morning dose of oxycodone but does not want a change in the dose because of the effectiveness of the opioid in reducing her pain. She is delighted that she is once again able to walk to breakfast.

Per the algorithm, at this point the nurse should consider a conversion to a LAO. Older adults who require more than four doses of a SAO per day may benefit from conversion to a LAO for several reasons. In a study of over 10,000 residents of nursing homes, LAOs were found to be superior to SAOs in improving function and increasing social engagement (Won et al., 2006). Sleep quality has also been shown to improve when LAOs are substituted for SAOs (Caldwell, et al., 1999). Use of LAOs may also improve adherence to the recommended dosing schedule and decrease the focus on pain that is required when SAOs are prescribed (Rauck, 2009). This allows older adults to focus on aspects of their lives other than pain and pain management (Valler and, 2003).

It is unclear, however, if use of LAOs is superior to SAOs for relief of pain. The evidence that exists is frequently contradictory (Adler, McDonald, O'Brien, & Wilson, 2002; Bodalia, McDonald, Smith, & O'Brien, 2003; Caldwell, et al., 1999; Hale, et al., 1999) and represents an aspect of pain management that requires further study. Although both SAOs

and LAOs play important roles in pain management (Fine, Mahajan, & McPherson, 2009), critical thinking and thorough assessment of pain pattern is crucial to evaluating when one or the other, or both, formulations should be used.

The example of pain assessment and management presented here is relatively straightforward. In clinical practice, some cases are this simple while others are not. For instance, some cases require multiple trials of increasing doses of analgesics (for which there are titration algorithms) or addition of medications for specific types of pain, such as neuropathies (which requires the use of the neuropathic pain algorithm). Also, untoward responses to analgesics may necessitate the use of separate algorithms focused on side effect assessment and management. This emphasizes the need to individualize pain management strategies that are guided by algorithms, not controlled by them.

## Summary

In recent years, research has resulted in significant advances in knowledge of pain and its management. CPGs for management of persistent pain in older adults developed by the AGS (2009) and AMDA (2009) effectively summarize current best practice gleaned through this research. Algorithms provide a user friendly method for applying CPGs in clinical practice.

The algorithms Helen's nurse consulted directed her/him to perform a thorough pain assessment that led to the conclusion that a trial of a short-acting opioid was the appropriate first steps toward better pain relief. Although the algorithms provided the nurse with a logical approach to decision-making, they did not provide detailed instructions for performing a thorough pain assessment or identifying specific opioids to use for managing pain. Effective use of the algorithms requires sound critical thinking skills as well as knowledge of pharmacologic and non-pharmacologic methods for management of persistent pain in older adults.

Research indicates, however, that nurses often lack basic knowledge of how to perform a thorough pain assessment and medications used to treat pain, (Fink & Gates, 2006, Weiner & Rudy, 2002). In light of these knowledge deficits, algorithms are best presented in a class and/or coupled with resource materials that provide basic pain assessment and management information. This comprehensive approach of education, support and algorithms is currently being tested in a federally-funded study (Ersek, DuPen, & Kerr, 2005). Another approach that may prove useful is to develop web-based versions of the algorithm with embedded links to additional resources; this approach also is being investigated (Teigland & Ersek, 2008).

Algorithms provide a useful tool for guiding nursing practice and improving patient outcomes. Pain management lends itself well to the use of algorithms for assessment and treatment. Future nursing research using algorithms to direct other aspects of patient care is indicated.

## Acknowledgments

The research and development of the algorithms discussed herein were supported by funding from the National Institutes of Health, National Institute of Nursing Research (grant No. R01-NR009100). The authors of this article have disclosed no significant ties,

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**Basic Elements of Pain Assessment**

- Location
- Intensity
- Pattern (for example: constant, intermittent)
- Duration
- Character (for example: sharp, burning, aching)
- Effect on physical functioning and mobility
- Effect on mood, social functioning, and sleep
- Factors that exacerbate and alleviate
- Current treatment regimen
- Adverse effects of therapy

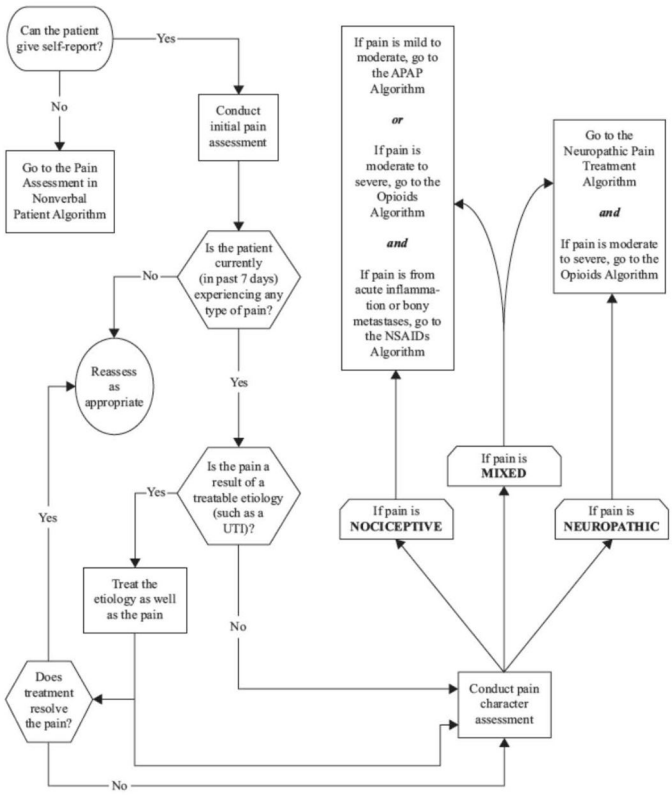


**Figure 1.**

Pain Assessment Algorithm

APAP = acetaminophen; NSAIDs = nonsteroidal antiinflammatory agents; UTI = urinary tract infection.

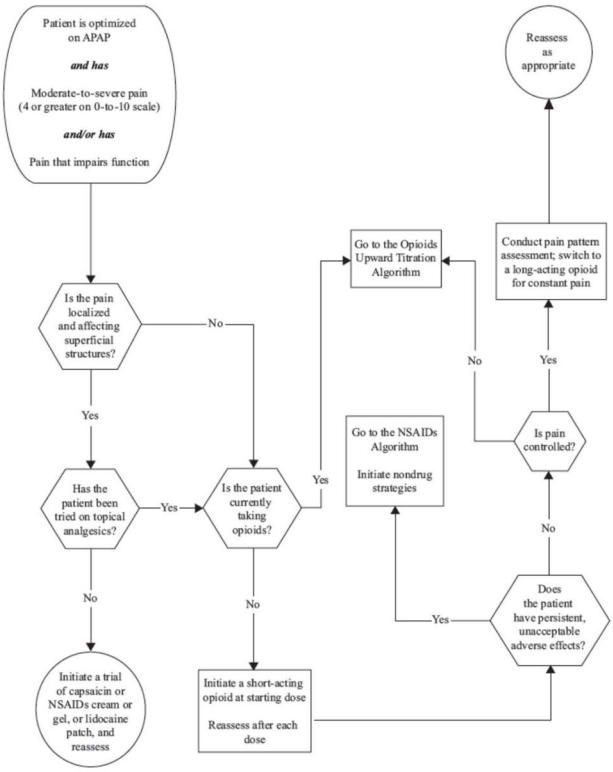


**Figure 2.**

Opioids Algorithm

APAP = acetaminophen; NSAIDs = nonsteroidal antiinflammatory agents.

**Table 1**

Comparison of Nociceptive and Neuropathic Pain

| | **Nociceptive Pain** | **Neuropathic Pain** |
|---|---|---|
| **Definition** | Normal processing of stimulus that damages normal tissue or has the potential to do so if prolonged. | Abnormal processing of sensory input by the peripheral or central nervous system. |
| **Types** | ***Superficial somatic pain*** arises from skin, mucous membranes, subcutaneous tissue; tends to be well localized.<br>**Examples:** sunburn, skin contusions<br>***Deep somatic pain*** arises from muscles, fasciae, bones, or tendons; localized or diffuse and radiating.<br>**Examples:** arthritis, tendonitis, myofascial pain<br>***Visceral pain*** arises from visceral organs, such as the GI tract or bladder; well or poorly localized; often referred to cutaneous sites.<br>**Examples:** appendicitis, pancreatitis, cancer affecting internal organs | ***Central pain*** caused by primary lesion or dysfunction in the central nervous system.<br>**Examples:** poststroke pain, pain associated with multiple sclerosis<br>***Peripheral neuropathies*** felt along the distribution of one or many peripheral nerves; caused by damage to the nerve.<br>**Examples:** diabetic neuropathy, alcoholic or nutritional polyneuropathy, trigeminal neuralgia, postherpetic neuralgia<br>***Deafferentation pain*** results from a loss of afferent input.<br>**Examples:** phantom limb pain, postmastectomy pain<br>***Sympathetically maintained pain*** persists secondary to sympathetic nervous system activity.<br>**Examples:** phantom limb pain, complex regional pain syndromes |
| **Character** (how pain is typically described) | Aching, throbbing, cramping, dull, sharp, tender. | Shooting, electric-like, burning, stabbing, pins and needles. |
| **Treatment** | Usually responsive to nonopioid drugs, opioid drugs, or both. | Usually includes adjuvant analgesics. For example:<br>• topical agents such as capsaicin (Capsagel and others), lidocaine (Lidoderm and others)<br>• anticonvulsants such as gabapentin (Neurontin), pregabalin (Lyrica)<br>• tricyclic antidepressants such as desipramine (Norpramin), nortriptyline (Pamelor, Aventyl)<br>• alternative antidepressants such as venlafaxine (Effexor), bupropion (Wellbutrin and others) |