

Pain and Symptom Management in Pediatric Palliative Care

Kelly Komatz, MD, MPH,* Brian Carter, MD†

*Division of Community & Societal Pediatrics, University of Florida College of Medicine, Jacksonville, FL.

†Division of Neonatology & Bioethics Center, University of Missouri-Kansas City & Children's Mercy Hospital, Kansas City, MO.

Practice Gap

Chronic pain in childhood is underrecognized, and clinicians are unfamiliar with treatment options and symptom management in children with chronic medical conditions.

Objectives

After completing this article, the reader should be able to:

1. Discuss the features of a detailed pain history leading to the origins of pain.
2. Identify the first lines of treatment for a pediatric patient experiencing pain.
3. Define different symptoms associated with chronic medical conditions.
4. Identify treatment options to control symptoms for pediatric patients.

Abstract

Pain and symptom management is considered one of the cornerstones of palliative and hospice medicine. However, general clinicians and specialists are not usually comfortable addressing the most common forms of pain seen in the pediatric population. In addition, non-pain symptom management, especially when related to underlying chronic medical conditions, can be managed by the general clinician and specialists. The goal of this article is to educate clinicians about pain categories, taking a detailed pain history, and developing a plan for treatment, including nonpharmacologic methods. Finally, we discuss common symptoms in patients with chronic medical conditions, including first-line treatment options.

AUTHOR DISCLOSURE Drs Komatz and Carter have disclosed no financial relationships relevant to this article. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

***“The concepts of pain and suffering go well beyond that of a simple sensory experience. It has emotional, cognitive, and behavioral components as well as developmental, environmental and socio-cultural aspects” – American Academy of Pediatrics and American Pain Society policy statement
September, 2001***

PAIN HISTORY

A patient's pain history is often obtained as part of the routine history during medical encounters. Pain is usually easy to assess in an adult, but how does one assess pain in a pediatric patient from infancy to adolescence? Pain management continues to be an area of uncertainty for clinicians. Common concerns include, "If I treat the pain with an opioid, I might make the patient a drug addict." or "If I undertreat the pain, it might result in my patient missing school, having behavioral issues, or being depressed." Multiple modalities, including nonpharmacologic interventions, are available to help control a patients' pain.

As with most diagnoses in medicine, the answer to treating a patient's pain lies in the details of the history. It is essential to obtain a thorough pain history from the patient, if possible, and collaborate with the caregivers. Of note, it is the patient's history that matters. Even patients as young as 2 years can answer very basic questions related to their pain. Research has demonstrated that parents may underestimate their child's postoperative pain, but they can reliably offer observations and judgments about a young child's pain behaviors, responses, and factors that may exacerbate or ameliorate pain when presented in a structured format (Table 1). (1)

The details of a thorough pain history include asking questions related to when the pain first started, what makes it worse, and what makes it better. The quality of the pain should be defined: sharp, dull, feels like pressure or pulling, cramping, stabbing, needlelike, or burning. Does the pain radiate and if so, to where? Is the pain constant or intermittent; does it come on suddenly or start slowly; and does it interrupt particular daily functions, activities, or sleep? What does the patient do to make the pain go away? What interventions, including medications, physical therapy, or other modalities, have been tried and what was the response? The history and answers to these questions can guide the differential diagnosis of the type of pain: somatic,

visceral or neuropathic (Table 2). Treatment options differ for each type of pain.

PAIN SCALES

Validated pain scores or rating scales should be used to measure and assess the severity of pain consistently. The effectiveness of the treatment plan can be evaluated using the same rating scale. Pain rating scales are available for infants, nonverbal patients, and patients who are able to verbalize a response. The scales are multimodal and incorporate behavioral and physiologic components, including facial expression (grimace), extremity position and movement (flexion), body habitus (stillness or inability to get comfortable), heart rate, blood pressure, and oxygen saturation. Examples include:

- Neonatal Infant Pain Scale (NIPS) (2), a behavioral assessment tool for preterm and term neonates up to 6 weeks after birth
- Pediatric FACES, used for patients from ages 3 to 7 years (3)
- FLACC (Face, Legs, Activity, Cry, Consolability) Scale for nonverbal patients (4)(5)

A numeric scale from 0 to 10 is commonly used for children who are older and can self-report a number. Clinicians must remember to ask the patient, unless he or she is unable to communicate, about the level of pain. Parents might over- or underreport their child's degree of pain. Also, asking the patient begins to nurture a therapeutic relationship that continues with pain treatment.

TYPES OF PAIN

The diagnostic groups of pain are defined by their mechanistic causes. Nociceptive pain is usually due to tissue damage (mechanical or traumatic) or inflammation and can be classified as somatic or visceral. Visceral pain affects the internal organs and the soft tissue of the body. It is commonly described as being sore, gnawing, achy,

TABLE 1. Pain Assessment Questions

PROVOKES	QUALITY	RADIATES	SEVERITY
Aggravating and/or alleviating factors:	What does it feel like?	Does the pain radiate?	Using the pain scale:
What causes the pain?	Sharp?	If yes, where does it start?	What is the worse pain?
What makes it better?	Dull?	Where does it move to?	What is the least pain?
What makes it worse?	Stabbing?		What is the level now?
	Burning?		What is your acceptable level of pain?

TABLE 2. Types of Pain and Descriptive Terms

SOMATIC	VISCERAL	NEUROPATHIC
• Throbbing lancinante	• Not well-localized	• Pins and needles
• Aching	• Involves abdominal area	• Hot or burning
• Sometimes sharp aigue/intense	• Gnawing	• Numbness engourdissement
• Well-localized	• Cramping	• Aggravated by touch – even clothes
	• Intermittent	
	• Nausea	
	• Vomiting	
	• Pressure-like	

pressure, or cramping. Somatic type pain is described more often as constant, worsening with movement, sharp, throbbing, and is usually localized to a specific body area such as an extremity or the back. Neuropathic pain is usually due to nerve fiber damage (pressure, trauma, swelling, inflammation) or entrapment of nerves. Neuropathic pain is best described as burning, shooting, and stinging and can be associated with skin color changes (autonomic vasomotor changes) or an inability to tolerate even light touch without experiencing pain.

Distinguishing between acute and chronic pain is also important. Acute pain is experienced when there is an injury to a body tissue. As healing occurs, the pain resolves. The goal of managing acute pain is to relieve the pain during the body’s healing process. However, there is a propensity to develop hyperalgesia in areas of repetitive tissue damage (eg, repeated heel lancing in an infant) where the “field” of receptors becomes hypersensitive to less invasive sensation. Chronic pain persists after the initial insult has “healed.” The causative agent cannot be removed. The overall treatment goal for a patient with chronic pain is functional improvement; total pain relief is rarely achievable. Chronic pain has been demonstrated to cause central nervous system changes affecting feelings and complex thoughts. (6)(7)(8)

PAIN MANAGEMENT

Management depends on the category or type of pain. Nociceptive pain is treated with nonsteroidal anti-inflammatory drugs for mild pain, with the addition of opioids for moderate-to-severe nociceptive pain. An important point is that many orally administered opioid medications contain acetaminophen. Therefore, the patient and parents/caregivers should be specifically counseled about the potential cumulative effect

of acetaminophen and reminded not to take other medications containing acetaminophen so as to minimize the potential for liver toxicity. Also, **codeine is no longer recommended for children** due to the potential for acute overdose in those who have hypermetabolism, a genetic predisposition that is generally unknown to the patient or clinician. (9) Affected children rapidly metabolize codeine into morphine and are more prone to respiratory depressant effects. Therefore, **only hydrocodone or oxycodone should be used if an opioid is necessary.**

Clinicians must recognize the different potencies of opioids, especially when they are changing a prescription between intravenous and enteral formulations. For example, intravenous morphine is three times more potent than oral morphine. Also, **oxycodone is more potent** than morphine and hydrocodone **in enteral formulation.** Therefore, clinicians should work with a pharmacist, palliative care clinician, or pain/anesthesia specialist when treating a patient with any opioid or use references that assist in determining equivalent intravenous and enteral dosing.

Neuropathic pain is treated with gabapentinoids. The theory behind using the gabapentinoids is their inhibition of excitation within the central nervous system. The two common medications used are **gabapentin** and **pregabalin.** Other medications that affect the central nervous system can also be used, including **tricyclic antidepressants, serotonin norepinephrine reuptake inhibitors, and anticonvulsants.** **Chronic opioid therapy has no role in the treatment of neuropathic pain.**

Other, nonpharmaceutical treatment modalities for pain management often prove more effective for patients experiencing pain or other symptoms related to an underlying condition or adverse effects from treatments. Such interventions include **biofeedback, guided imagery, meditation, hypnosis, and acupuncture.** Among the physical measures that can prove

effective are therapeutic **massage**, the application of **heat or cold, healing touch or Reiki, and physical/occupational therapies**. Activities that provide distraction, such as music, art, or other expressive therapies, have been proven to be beneficial in patients with chronic pain. Clinicians should be familiar with the resources available in their own areas and encourage the patient and family to consider these other modalities of treatment.

SYMPTOM MANAGEMENT

Symptom management in children requires astute attention to clinical assessment tools and scales. It is important for the child to contribute to this assessment by answering specific questions after being presented age-appropriate cues. (10) Admittedly, this approach may pose a challenge with a child who has a chronic complex medical condition, but the results can be worthwhile. Generally, an otherwise healthy pediatric patient has acute symptoms related to one or two organ systems. The child who has a chronic complex medical condition usually has more than two organ systems affected, which can lead to multiple symptoms that require concomitant management. The most common symptoms in children with chronic complex medical conditions are pain, nausea and vomiting, dyspnea, fatigue, anorexia and weight loss, depression, anxiety, and sleep disturbances. Table 3 lists common medications used to relieve pain and other systemic signs and symptoms.

Nausea, with or without vomiting, is the most common symptom other than pain in children with chronic medical conditions. Several physiologic mechanisms contribute to nausea and vomiting. Nausea is mediated through the autonomic nervous system. Distension of an organ within the abdominal cavity triggers the gastric mechanoreceptors that stimulate the vagal afferent fibers. Also, stimulation of receptors in the medulla by toxins or increased intracranial pressure can induce nausea. The vestibular system can also cause nausea with or without vomiting, but this is less commonly seen in the pediatric patient. Although nausea may be perceived as a problem, it also can serve to indicate the nature or locus of certain conditions that require assessment, such as increased intracranial pressure, adverse drug effects or exposure to toxic agents, or bowel distention that deters eating so as to mitigate ongoing gastrointestinal distress. If nausea accompanies chemotherapy or other medications that are necessary in a patient's care, its treatment may be essential to improve the patient's quality of life. Treatment may also make living with certain vestibular dysfunctions more bearable and facilitate eating.

Vomiting is coordinated by the vomiting center. Several afferent pathways lead to the vomiting center, including the chemoreceptor trigger zone, the cerebral cortex and limbic system, the vestibular system of the inner ear, and peripheral stimuli. The neural receptors involved in both the peripheral and central nervous system are mediated by dopamine receptor type 2, serotonin receptor type 3, histamine receptor type 1, and muscarinic cholinergic receptors. Like nausea, vomiting may indicate an underlying problem requiring identification and correction or be an adverse effect of necessary medical management (eg, medications) for which treatment of the vomiting may be useful.

The choice of pharmaceutical agent for treatment of nausea and vomiting is based on the likely pathway affected in the vomiting center. For example, most chemotherapeutic agents affect the chemoreceptor trigger zone, which is the reason for frequently using promethazine before chemotherapy administration.

Metoclopramide can be used if gastric distension is suspected as the underlying cause of nausea. Scopolamine or glycopyrrolate may be appropriate if nausea is attributed to the vestibular system. If increased intracranial pressure is suspected, dexamethasone is indicated. Ondansetron, a serotonin 5-HT₃ receptor antagonist, may be used in children older than 4 years to prevent postoperative nausea and vomiting, or that associated with chemotherapy.

Constipation is a common adverse effect of opioid pain medication, dehydration, decreased ambulation, or diet. A bowel regimen that mitigates constipation should be simultaneously prescribed for any patient receiving long-term opioids. Constipation often leads to nausea and, at times, vomiting. Laxatives and stool softeners are the mainstay of treatment for constipation. It is important to use the most effective combinations to maintain regular bowel movements while not causing more gastrointestinal distress.

Dyspnea is defined as feeling short of breath, which may be due to actual difficulty in breathing or to chest wall or pleural pain associated with breathing. Results of the traditional respiratory assessment, including respiratory rate, oxygen saturation, and blood gases, do not always correlate with the patient's report of breathlessness. Dyspnea scales used in some adult populations, such as those with chronic obstructive pulmonary disease, are not applicable to children. The best studied dyspnea scale in pediatrics is the Dalhousie Dyspnea Scale (Figure) which has been used in children with asthma or cystic fibrosis. (11)

Causes of dyspnea include an underlying pulmonary disease, anemia, airway obstruction, and heart failure. A trial of supplemental oxygen, a fan blowing on the patient's face, repositioning, and relaxation techniques are suggested

TABLE 3. **Commonly Used Medications for Pain and Symptom Management**

SYMPTOM	MECHANISM OF ACTION	DOSE RANGES	ROUTES OF ADMINISTRATION	ADVERSE EFFECTS/ COMMENTS
Nausea/Vomiting				
Promethazine	Chemoreceptor trigger zone	>2 years of age 0.25–0.5 mg/kg per dose every 4 to 6 hours as needed; maximum initial dose 12.5 mg	PO, PR	Sedating Extrapyramidal effects
Metoclopramide	Gastric stasis	0.1–0.2 mg/kg per dose 3 times a day before meals as needed; maximum dose not to exceed 0.8 mg/kg in any 24-hr period	PO, PR	Sedating Extrapyramidal effects
Lorazepam	Central nervous system - anxiety	0.03–0.05 mg/kg per dose every 6 hours as needed; maximum initial dose not to exceed 2 mg	PO, SL, PR, IV	
Dexamethasone	Central nervous system – increased intracranial pressure	0.1 mg/kg per dose 3 times per day; maximum initial dose 5 mg	PO, PR, SL, IV	Typically used for nausea/vomiting related to chemotherapy
Ondansetron		0.15 mg/kg per dose every 8 hours as needed; maximum dose not to exceed 8 mg	PO, IV	Limited data on children < 2 years old
Constipation				
Polyethylene glycol 3350	Osmotic laxative	20–40 mL/kg/hour until rectal effluent is clear; or 1 to 1.5 L/hour up to a 4-L maximum	PO	Cramping, bloating, and nausea Administer with adequate free water
Senna syrup (218 mg/5 mL)	Gastrointestinal tract stimulant	Age 6–24 months: 1.25–2.5 mL every night Age 2–6 years: 2.5–3.75 mL every night Age ≥6 years: 5–7.5 mL every night	PO	Cramping
Glycerin	Local action for stool in vault	Based on patient age	PR	Can use slivers or full suppository, depending on patient's age
Dyspnea				
Morphine immediate release	Central nervous system suppression	0.1 mg/kg PO every hour and titrate as necessary	PO, SL, SC, PR, IV	Maximum dose determined by adverse effects (eg, respiratory depression) more so than mg dose; especially in patients who have been receiving opioid therapy; titrate to effect
Lorazepam	Benzodiazepine Central nervous system - anxiety	Depends on route of delivery; 0.1 mg/kg enteral forms	PO, SL, PR, IV	Appropriate if patient has a component of agitation

Continued

TABLE 3. (Continued)

SYMPTOM	MECHANISM OF ACTION	DOSE RANGES	ROUTES OF ADMINISTRATION	ADVERSE EFFECTS/ COMMENTS
Neuropathic Pain				
Gabapentin	Antiepileptic	5 mg/kg every night for 3 nights 5 mg/kg BID for 1 days 5 mg/kg per dose TID OR 5 mg/kg per dose AM and 10 mg/kg per dose every night	PO	Must titrate up to maximum effective dose due to sedation Attempt to use BID dosing, especially in school-age patients Use higher doses at bedtime
Nortriptyline	Tricyclic antidepressant	0.2 mg/kg every night for 3 nights 0.4 mg/kg every night	PO	Urinary retention

PO=oral, PR=rectal, IV=intravenous, SC=subcutaneous, SL=sublingual.

Adapted from: Storey P, Knight CF, and Schonwetter RS. *American Academy of Hospice & Palliative Medicine's Pocket Guide to Hospice/Palliative Medicine*, 2003. AAHPM, 4700 W. Lake Avenue, Glenview, IL

treatments. Anxiolytics, such as lorazepam, are used to control anxiety that may contribute to the sensation of shortness of breath, especially in end-of-life situations. Morphine sulfate is commonly used by palliative care practitioners to control dyspnea but in lower doses than used for pain management, such as 0.05 mg/kg administered intravenously or subcutaneously.

Fatigue is often experienced by patients as they enter the last months of life, and this becomes an area of focus and concern for both the patient and caregivers. Anemia, infection, uncontrolled pain, deconditioning, poor dietary intake, sleep disturbances, depression, anxiety, and adverse effects

of medications all may contribute to fatigue. The treatment should focus initially on treatment of underlying causes such as depression, anxiety, or sleep disturbances. The patient also should be encouraged to take frequent naps or modify activities. At times, methylphenidate can be used to increase the patient's wakefulness, especially for important events that the patient and family desire.

CONCLUSION

Although not exhaustive, this review is intended to assist the clinician in taking a thoughtful approach to pain and symptom

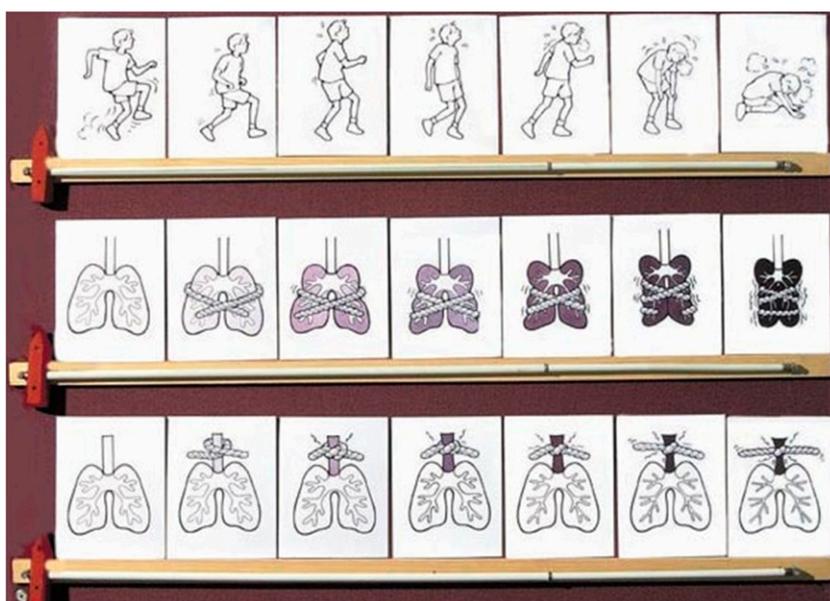


Figure. Dalhousie Dyspnea Scales. (11) © 2005 McGrath et al; licensee BioMed Central Ltd. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

assessment and management in children with complex and chronic medical conditions. Symptoms may wax and wane over the course of the child's life, at key times in development or with certain activities, or during hospitalizations for acute decompensations from a primary life-limiting disease. When causes of symptoms are understood, they can be anticipated and addressed, even before the child's end of life. In so addressing them, clinicians contribute to improved comfort and an enhanced quality of life for the patient and his or her family. Pediatric palliative care is a growing specialty, as evidenced by Accreditation Council for Graduate Medical Education-approved fellowship programs and the growth of inpatient and outpatient palliative care services associated with children's hospitals worldwide. Palliative care physicians are trained in recognizing and treating pain and symptoms in children with chronic medical conditions. By gaining knowledge about the common symptoms and initial treatments for such pain, treating clinicians can begin therapy while awaiting a referral to the appropriate subspecialist.

Based on consensus, the earlier a patient's pain and symptoms are addressed and managed, the sooner he or she can return to a previous level of function. The keys to the treatment plan can be found in the history and details related to the characteristics of the pain. Evaluation should encompass current medications or treatments that could be causing the pain, prompting clinicians occasionally to discontinue or change treatment. Appropriate early treatment can enhance the patient-clinician relationship and bring satisfaction to the treating clinician who is providing relief to the patient.

NOTE: The authors have made every effort to attempt to check specific medication dosing for accuracy. Due to incomplete pediatric dosing information on some drugs, we recommend the reader check current specific product information and published literature, or consult your pharmacist, for questions.

CME quiz and references for this article are at <http://pedsinreview.aappublications.org/content/36/12/527.full>.

Parent Resources from the AAP at HealthyChildren.org

- <https://www.healthychildren.org/English/family-life/health-management/pediatric-specialists/Pages/What-is-a-Hospice-and-Palliative-Medicine-Pediatrician.aspx>

PIR Quiz

There are two ways to access the journal CME quizzes:

1. Individual CME quizzes are available via a handy blue CME link in the Table of Contents of any issue.
2. To access all CME articles, click "Journal CME" from Gateway's orange main menu. Use the publications filter at right to refine results to a specific journal.

1. You see a 3-year-old girl with autism who was in a motor vehicle collision with her family. She has a nondisplaced fracture of the right forearm. You want to assess her pain level before sending her home with pain medication. She is nonverbal and inconsistent with communicating using gestures. Her mother is at the bedside and also sustained several minor orthopedic injuries. Which of the following methods is most appropriate to assess this child's pain?
 - A. FACES scale.
 - B. FLACC scale.
 - C. Maternal perception of girl's pain.
 - D. NIPS scale.
 - E. Numeric 1–10 scale.
2. A 17-year-old adolescent had spinal fusion to treat severe scoliosis associated with muscular dystrophy. Since his surgery, he has had shooting and burning pains down his left leg. He is being treated with physical therapy and massage. His parents ask if there is a medication that would help manage his pain. Of the following, the best recommendation for pain management in this patient is:
 - A. Acetaminophen.
 - B. Gabapentin.
 - C. Hydrocodone.
 - D. Lorazepam.
 - E. Music therapy.
3. A 13-year-old girl was treated surgically for a large ovarian cyst approximately 1 year ago. During the past 9 months, she has had recurrent abdominal pain for which she has undergone multiple evaluations that yielded normal examination and study findings. You speak with the girl and her family about treatment for her pain. Of the following, the most appropriate recommendation for treating this patient's recurrent abdominal pain is:
 - A. Anxiolytic medication for 1 month.
 - B. Guided imagery and meditation.
 - C. High-dose anti-inflammatory medication.
 - D. Intense aerobic exercise daily.
 - E. Low-dose opioid medication.
4. A 6-year-old boy is hospitalized for bowel obstruction. He has severe nausea. Which of the following medications is the best choice for this boy's pain?
 - A. Dexamethasone.
 - B. Metoclopramide.
 - C. Ondansetron.
 - D. Promethazine.
 - E. Scopolamine.
5. A 17-year-old young man is hospitalized with severe dyspnea related to cystic fibrosis. The most accurate method of assessing his dyspnea is:
 - A. Arterial blood gas.
 - B. Dalhousie Dyspnea Scale.
 - C. Oxygen saturation.
 - D. Respiratory rate.
 - E. Pulmonary function tests.

REQUIREMENTS: Learners can take *Pediatrics in Review* quizzes and claim credit online only at: <http://pedsinreview.org>.

To successfully complete 2015 *Pediatrics in Review* articles for AMA PRA Category 1 Credit™, learners must demonstrate a minimum performance level of 60% or higher on this assessment, which measures achievement of the educational purpose and/or objectives of this activity. If you score less than 60% on the assessment, you will be given additional opportunities to answer questions until an overall 60% or greater score is achieved.

This journal-based CME activity is available through Dec. 31, 2017, however, credit will be recorded in the year in which the learner completes the quiz.

Pain and Symptom Management in Pediatric Palliative Care

Kelly Komatz and Brian Carter
Pediatrics in Review 2015;36;527
DOI: 10.1542/pir.36-12-527

Updated Information & Services

including high resolution figures, can be found at:
<http://pedsinreview.aappublications.org/content/36/12/527>

References

This article cites 11 articles, 2 of which you can access for free at:
<http://pedsinreview.aappublications.org/content/36/12/527#BIBL>

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://beta.pedsinreview.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://beta.pedsinreview.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



Celebrating
35 Years
1979-2014



Pediatrics in Review

An Official Journal of the American Academy of Pediatrics

Pain and Symptom Management in Pediatric Palliative Care

Kelly Komatz and Brian Carter
Pediatrics in Review 2015;36;527
DOI: 10.1542/pir.36-12-527

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pedsinreview.aappublications.org/content/36/12/527>

Pediatrics in Review is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1979. Pediatrics in Review is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2015 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0191-9601.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

