PAIN AND SYMPTOM MANAGEMENT IN PEDIATRIC PALLIATIVE AND HOSPICE CARE

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Pediatric e-Journal
Pediatric Palliative and Hospice Care

Issue #73 | December 2023

Issue Topic: Pain and Symptom Management in Pediatric Palliative and Hospice Care

Welcome to the 73rd issue of our Pediatric e-Journal. In this issue, we thought it would be useful to focus on topics related to pain and symptom management in pediatric palliative and hospice care. At the same time, our plan has been to address these subjects in an innovative way that would emphasize the many different professional contributions that can be made to the management of pain and five other broad symptom categories that are commonly faced in pediatric palliative and hospice care. Using pain and the other symptoms as our primary headings, we invited contributors to each write short paragraphs illustrating how their particular professional discipline could approach one or more of the topics in question. As you will see, many contributors were able to offer instructive guidance in this new-for-us format.

What we also learned, however, is that there are many topics that do not lend themselves to this short-form structure. Some topics, such as pediatric pain scales, simply require more lengthy exposition in order to do justice to their substance.

As a result, in this issue you will find a combination of many short-form contributions and other longer contributions. The latter are more like those in all other issues of this Pediatric e-Journal. The former will precede the latter under the primary headings that we have chosen for this issue, i.e., Pain, Nausea/Vomiting, Constipation, Anxiety/Agitation/Delirium, Respiratory Distress/Secretions/Dyspnea, and Autonomic Disfunction/Seizures. The outcome is the longest issue of this Pediatric e-Journal that we have ever offered to readers. It contains 23 short-form articles and 16 long-form articles that together fill over 140 pages.

We believe that the result of all of this innovative formatting allows us to offer readers a broad array of ideas and insights from the experiences and expertise of the contributors to this issue. Nevertheless, we do not expect that a single issue of our e-Journal will cover every possible aspect of approaches to pain and the other common symptoms encountered in pediatric palliative/hospice care. However, it is our hope to guide readers to as many important ways of addressing these topics as possible—and perhaps to draw attention to some professional approaches that may be less widely known or appreciated.

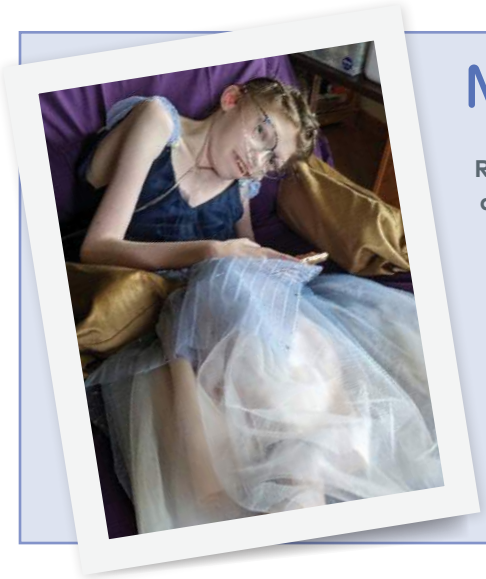
This e-Journal is produced by the Pediatric e-Journal Workgroup and is a program of the National Hospice and Palliative Care Organization. The Pediatric e-Journal Workgroup is co-chaired by Christy Torkildson and Suzanne Toce. Chuck Corr is our Senior Editor. Archived issues of this publication are available at www.nhpco.org/palliativecare/pediatrics/

Comments about the activities of NHPCO's Pediatric Advisory Council, its e-Journal Workgroup, or this issue are welcomed. We also encourage readers to suggest topics, contributors, and specific ideas for future issues. We are currently discussing the topic of multidisciplinary approaches to rare diseases and conditions for our first issue in February 2024. Beyond that, we are open to suggestions for our 75th issue in May 2024 and for the other two

issues to follow later next year. If you have any thoughts about potential topics for these future issues and/or potential contributors (including yourself?), please contact Christy Torkildson at Christy.Torkildson@gcu.edu or Suzanne Toce at tocess@gmail.com.

Views expressed in this and other issues of the Pediatric e-Journal are exclusively those of the authors and do not necessarily reflect the views of the Pediatric e-Journal Workgroup, the NHPCO Pediatric Council, or the National Hospice and Palliative Care Organization.

Produced by the Pediatric e-Journal Workgroup



McKenzie Rose Stothers†

Readers of Issue #72 of our Pediatric e-Journal will recall the brilliant article, "Death and Life," contributed by McKenzie Rose Stothers. McKenzie was 15 when she wrote her insightful article and its appearance in our e-Journal fulfilled her goal of becoming a published author. For those who missed that article, we are reprinting it here in Issue #73 in her memory, because it is with sadness that we must now report that McKenzie died on November 5, 2023, as a result of a lifetime of struggling with complex heart defects and 22q Deletion Syndrome. We will miss her unique spark of life. Her obituary is available to view.

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Death And Life

By McKenzie Rose Stothers

In the dark of night, a shadow loomed about, quietly watching as Life went on all around, mocking him or so he thought.

Death watched as two humans found the kitten at the side of the road, which Death had just put there himself. He had found it happy, young, and blissful. He had wanted to feel those things too, so he touched the tiny creature and soon it started moaning and crying in pain. Scared of what he did, Death gently picked up the kitten and put it where a human might find it. And then he fled back into the comfort of the darkness.

"Look, this poor kitten. Where do you think its mother is?" the man asked.

"I don't know. We need to get it help. Death has done enough to it already!" the woman said. As they took the small fragile kitten into their arms and drove away, Death sighed and kept going through the night, unseen.

"I don't know why that happened. I didn't think Death killed like that—that I killed like that. I just thought I would somehow get this feeling that someone was in pain and needed to die, then take them to wherever else they were supposed to go. Life has a much better job than I," Death said, floating through the shadows, feeling unseen, never touched nor loved; only feared.

From a distance, he could see the animal hospital and human hospital. The two humans were getting out of their car when he first saw her—Life. She was beautiful and graceful and kind, as well as content; something Death knew nothing about.

Life floated through the walls and found the kitten. She started gently petting it and soon the kitten's breathing went back to normal and it was sleeping peacefully. "May you live a long life until Death is ready to come for you and bring you back to your mother and siblings," Life said. She went back outside, taking her beauty and happiness, and distributing it onto everything she touched.

Death continued to watch from afar as the two humans and their new cat got into the car. But before they left, the vet came back out of his office. "This kitten is lucky for you to have been there or Death would've taken her for certain. Please look out as Death can take you by surprise any day," the vet said and went back into the hospital.

"I don't want to be Death! I'd rather be Life!" He shouted. It was so loud that it came to the ears of Life, who had just brought a newborn girl into the world.

Life floated through the forests and trees and mountains until she got to the edge of the world, where Death was standing.

"Death, you and I have been here longer than anyone. I think you know that, if you were Life, the world wouldn't operate as it does. This world and all of the others need both of us—Life and Death, new and old, sadness and happiness—as nobody would be content with a forever life. Everyone in this universe and the next need both of us. They need both sides of the coin. And if you continue the way you have been, all will be fine. I promise you," Life said, her eyes showing all the wonders of life and the beauty of love.

"But everyone hates me!" Death shouted, angry and scared.

"I don't think that's true. I'll show you. Follow me."

And so Life and Death went into the hospital to find an old man on many hospital tubes and an IV, moaning in pain.

"Please, Death, take me into the afterlife. Take this pain from me. I don't have any other use here. Please take me away from this place!" he cried in earnest.

"Go on. Be his hero," Life said with a grin.

"I heard you calling. I'm Death. I hear you're ready to come live with me in the afterlife. You will be able to make it whatever you want," Death said, trying to speak in a grim voice, but he only sounded sincere.

"Please, just take me away from this horrible place!" the man cried.

"Let us depart," Death said. Taking the old man's hands within his own and letting his spirit go free.

"Thank you, Death! You don't know how grateful I am and never will know! I can finally join the rest of my family. You are my hero," he said as he went up into his blissful afterlife.

Death left him and went to find Life. But when he went to where Life had been standing moments before, she was no longer there. But her voice echoed through the world: "I'm proud of you, Death. And, you know, even though you are Death, Death was born; even Death is alive in a way." And with that, she was gone once again.

Death went back home to the dark cobblestone streets, but he knew that, just like Life said, Life was everywhere; even in Death. And he knew Life was not mocking him; had not mocked him. She was his other half and he was loved.

And, as we know, Life and Death still coexist today; giving Life and bringing Death with each generation that passes. It is what makes Death so important. It's nothing to be feared, but it's not something to look forward to either. You know it's there, along with Life, forever dancing together on the edge of the world.

The end

Pain

Non-Pharmacological Pain Management (MUSIC)

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Regardless of age, pain management is at the forefront of palliative and hospice care. The palliation of pain and suffering is one of the most important goals for each member of the interdisciplinary team, inclusive of the expressive and complementary therapies. Music therapy that provides another alternative way to decrease the perception of pain is an area where a tremendous amount of evidenced-based research has taken place. Documented decreases in the perception of pain have been exhibited through interventions inclusive of guided imagery, breathing techniques through entrainment, and re-engagement of the mind in alternative stimulation. The board-certified music therapist holds the training to manipulate live music in a way to capture the whole brain and sustain the engagement of the person so the experience of pain can be lessened. It is as if the energy used to experience pain is taken and put somewhere else, whether that be through movement, breathing, singing, or visualization in conjunction with the musical stimuli.

Pain

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- Music for relaxation: this includes using live music guided by patient's respiratory rate, using musical elements to match patient's current state, and modifying musical elements to shift to a more ideal mood state, utilizing a steady consistent tempo, and low arousal music.
- Music listening: singing live versions of patient's familiar songs, CD recorded versions of appropriate music, family included in session.
- Imagery and music: using script that is relevant to a patient's needs or selected by patient by giving choices of themes, script is read supported with music playing softly.
- Multimodal relaxation: communication with patient through touch, sound, and ambiance, a range of materials can be used on the skin (scarfs, bumpy ball, tactile instruments that also emit soothing sound such as cabasa); the music therapist can also create improvisatory music around the experience.
- Improvisation: music is guided by the patient, a variety of instruments are selected depending on the patient's physical strengths, and the patient is given choices of instruments selected.
- Instrument playing: Involving family and the patient can make choices of instruments for others in the room, music is guided by the patient.
- Therapeutic song choices: Music is chosen by patient and family to provide autonomy and opportunity to contribute, patient-preferred music chosen by music therapist or patient can stimulate brain function, controlling movement, cognition, speech, emotions, and the senses.
- Songwriting: Patient and family members actively contribute to songwriting process; can be related to current state they're feeling or other emotions the patient has experienced in their disease process, can also include legacy projects for families including recordings and other tangible projects.

- Delany et al. (2023) surveyed 15 patients as a part of a pediatric palliative care program. Music therapy sessions demonstrated a statistically significant reduction of pain scores and heart rate, and an overall reduction in post-measurement of pain in both the FLACC scale and Likert pain scale. Parents were also asked to participate in interviews following music therapy sessions. Two major themes emerged: music therapy has a positive impact on physiological symptoms; and music therapy enhances the opportunity to experience joy. Delaney, A. M., Herbert, A. R., Bradford, N., & Bernard, A. (2023). Associations between music therapy, pain and heart rate for children receiving palliative care. *Music Therapy Perspectives*, 41(1), 75-83.
- Grocke, D., & Wigram, T. *Receptive methods in music therapy: Techniques and clinical applications for music therapy clinicians, educators and students*. Jessica Kingsley Publishers, 2006.
- Robb, S. L., Carpenter, J. S., & Burns, D. S. (2011). Reporting guidelines for music-based interventions. *Journal of Health Psychology*, 16(2), 342-352.

Patient L, was a 3-year-old female with congenital herpes viral infection. L would demonstrate with an agitated cry, often associated to pain. L's pain ranged from mild to moderate measured using the FLACC Scale. The music therapist would use a music therapy intervention called entrainment where she matched the patient's cry with patient-preferred music, then gradually simplified the song, calming the patient. Other music interventions often used with L to help manage pain focused on distracting and comforting her. Music therapy was crucial for L as the team was unsure how much she could see. L would often track where the music was coming from, whether that be the music therapist or a variety of instruments used in sessions.

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Pain: Employing child life services to offer care and support for children experiencing a pain crisis revolves around both developmentally-appropriate education and distraction. Ensuring that a child understands their pain in a developmentally-appropriate manner promotes better communication regarding pain, which in turn allows a provider to better support the child when pain occurs. Use of developmentally-appropriate pain rating scales is important; adapting a scale to a patient's abilities for communication is also vital in this endeavor.

Additionally, encouraging a child's engagement in distraction is helpful in pain management. Distraction can be as simple as conversation with another person or as complex as virtual reality. Use of a book, tablet, age-appropriate toys, arts/crafts, or other normative activity can be applied as distraction during a pain crisis.

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Pain is the combination of physical (medical diagnosis, procedures), emotional (fear, anxiety), and personal experiences (medical history). Certified Child Life Specialists (CCLS) empower the child by providing interventions ranging from medical education and distraction to control, which can reduce or extinguish a range of somatic and psychological comorbidities such as pain with anxiety and the time to complete a procedure or administer medications. When there is a positive outcome for the child, it creates better short and long-term health outcomes, willingness to cooperate in future medical procedures, and a positive perspective towards the medical team.

Assessing Pain in Infants and Children

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Pain is a major concern in the context of pediatric palliative care. Pain distresses not only the neonatal or pediatric patient but also the family and caregivers. Especially in the newborn, untreated pain can have long term detrimental neurodevelopment consequences. Assessment of the intensity of the pain is central to its management. Validated neonatal/infant and pediatric pain scales have been available for almost half a century and have been steadily improving. Many are easily adapted to the outpatient setting.

Below are some of the more common and easily available pain scores that can (and should) be utilized by caregivers at the bedside:

Neonatal/infant pain scores

Commonly used pain scores to assess acute pain in term neonates and young infants include N-PASS (Neonatal-Pain, Agitation and Sedation Scale), and the Neonatal Infant Pain Scale (NIPS). For postoperative pain, CRIES (crying, oxygenation, vital signs, facial expression, and sleeplessness) is recommended. COMFORT B and N-PASS scales are also suggested for chronic pain assessment in mechanically ventilated newborns.

NPASS (Neonatal-Pain, Agitation and Sedation Scale)

This is a scale that scores behavioral and physiologic parameters for both pain and sedation. It can assess continuous, acute, and chronic pain, and can identify distress and pain in neonates of all gestational ages. A score > 2 is generally an indication for analgesia initiation or increase.

Assessment criteria	Sedation		Sedation/pain	Pain/agitation	
	−2	−1	0/0	+1	+2
Crying irritability	No cry with painful stimuli	Moans or cries minimally with painful stimuli	No sedation/no pain signs	Irritable or crying at intervals Consolable	High-pitched or silent, continuous cry Inconsolable
Behavioral state	No arousal to any stimuli No spontaneous movement	Arouses minimally to stimuli Little spontaneous movement	No sedation/no pain signs	Restless, squirming Awakens frequently	Arching, kicking Constantly awake or arouses minimally/no movement (not sedated)
Facial expression	Mouth is lax No expression	Minimal expression with stimuli	No sedation/no pain signs	Any pain expression intermittent	Any pain expression continual
Extremity tone	No grasp reflex Flaccid tone	Weak grasp reflex Muscle tone	No sedation/no pain signs	Intermittent clenched toes, fists, or finger splay Body is not tense	Continual clenched toes, fists, or finger splay Body is tense
Vital signs HR, RR, BP, SaO_2	No variability with stimuli Hypoventilation or apnea	<10% variability from baseline with stimuli	No sedation/no pain signs	10%-20% from baseline SaO_2 76%-85%	↑20% from baseline SaO_2 ≤75% with stimulation – slow recovery Out of synchronization with ventilation

HR: Heart rate, BP: Blood pressure, RR: Respiratory rate

NIPS

This scale is useful to identify acute pain but may fail a to assess chronic or continuous pain.

Parameters	0 point	1 point	2 point
Facial expression	Relaxed	Grimace	-
Cry	No cry	Whimper	Vigorous crying
Breathing pattern	Relaxed	Change in breathing	-
Arms	Relaxed	Flexed/extended	-
Legs	Relaxed	Flexed/extended	-
State of Arousal	Sleeping/Awake	Fussy	-

CRIES

		Scoring		
CRIES	Indicators	0	1	2
Neonatal postoperative pain	Crying	No	High pitch but consolable	Inconsolable
Score < 4: initiate nonpharmacologic measures	Requires oxygen for Sat >95%	No	<30%	>30%
Score >4: initiate pharmacologic and nonpharmacologic measures	Increased vital signs	No	HR or BP increased <20%	HR or BP increases >20%
	Expression	None	Grimace	Grimace & Grunt
	Sleepless	No	Wakes frequently	Constantly awake

Abbreviations: BP, blood pressure; HR, heart rate.

Data from Krechel SW, Bildner J. CRIES: a new neonatal postsoperative pain measurement score. Initial testing of validity and reliability. Pediatric Anesthesia 1995;5:53–61.

NAS Neonatal Abstinence Syndrome

The Finnigan NAS scoring tool is used in neonates whose discomfort relates to withdrawal from maternal opioid use. This is particularly helpful in assessing need for and response to medication in those newborns with more significant symptoms.

Restructured Finnegan Scoring Tool (adapted from the original Finnegan Tool).

NEONATAL ABSTINENCE SCORING TOOL UMass Memorial/Modified				Date / /						
		Time								
	Signs & Symptoms	Score								
Score Before Feedings ONLY if Quiet & Content	Sleeps or Content < 3 hours	1								
	Sleeps or Content < 2 hours	2								
	Sleeps or Content < 1 hour	3								
	Hyperactive Moro Reflex	2								
	Hyperactive Moro w/Myoclonic Jerks	3								
	Mild Tremors when Disturbed	1 CNS								
	Moderate/Severe Tremors when Disturbed	2 CNS								
	Mild Tremors when Undisturbed	3 CNS								
	Moderate/Severe Tremors when Undisturbed	4 CNS								
	Increased Muscle Tone with Handling	1								
	Increased Muscle Tone at Rest	2								
	New (non-buttock) Skin Excoriation	1								
	Sweating	1								
	Low Grade Fever: 37.6-38.3°	1								
	High Grade Fever: >38.4°	2 MVR								
	Mottling	1 MVR								
30 Minutes after Feeding	Respiratory Rate >60 at Rest	1								
	Respiratory Rate >60 w/retractions at Rest	2								
	Excessive Sucking	1 GI								
	Poor Feeding	2 GI								
	Crying up to 5 minutes or Difficult to Console	2								
	Crying more than 5 minutes or Inconsolable	3 CNS								
Score over Entire Interval	Myoclonic Jerks	3 CNS								
	Seizure or Convulsion	5 CNS								
	Yawning 3 or more times over scoring interval	1								
	Nasal Stuffiness	1 MVR								
	Nasal Stuffiness w/nasal flaring	2 MVR								
	Sneezing 3 or more times over scoring interval	1 MVR								
	Regurgitation	2								
	Projectile Vomiting	3 GI								
	Loose Stools	2 GI								
	Watery Stools	3 GI								
		Total Score								
		Initials								

CNS=Central Nervous System function; MVR= Metabolic, Vasomotor, and Respiratory function; GI=Gastrointestinal function.

Pediatric pain scores

When considering pain in children, determine the following aspects:

- Chronic vs. acute
- Intensity
- Location
- Duration
- The nature, significance, and context of the child's pain experience
- Sensory aspects
- Cognitive aspects (impact on daily activities)
- Affective aspects
- Pertinent contextual and situational factors influencing pain perception

Numeric Rating Scale (NRS)for acute pain

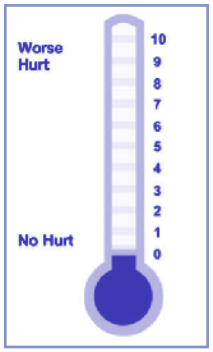
The NRS is the simplest and most used numeric scale in which the child rates the pain from 0 (no pain) to 10 (worst pain). Validity has been established for children 7 to 17 years old. The NRS also correlates well with perceived need for analgesia, pain relief, and patient satisfaction in children. Make sure that the child is using 10 for the denominator. Advantages of NRSs include simplicity, reproducibility, easy comprehensibility, and sensitivity to small changes in pain. Children as young as 5 years who can count and have some concept of numbers (i.e., that 8 is larger than 4) may use this scale. Although data are limited, this scale may also be used for post-operative and chronic pain.

FACES Pain Scale for children > 3 years

The Wong-Baker Faces Pain Scale is easy and quick to use. It is a nonverbal assessment, with minimal instructions required. It can be administered by a health care professional, parent, or an older child. Other scales may be more accurate in children over 6 years.

Visual Analogue Scale (VAS) for children > 3 years

The usual VAS consists of a 10 cm (4 inch) line labelled "No hurt" on the left and "Worst hurt" on the right. Numerical analogue scales are visual analogue scales with the numbers 0 to 10 in between. Children are asked to indicate their pain intensity by putting a mark on the scale that corresponds to their pain intensity (or how much they hurt).



Pain in children with unique assessment needs

Pain in children with sickle cell disease (SCD)

Commonly used tools to assess SCD associated pain include the Numeric Rating Scale for older children and the Faces Pain Scale (especially helpful in younger children). The Visual Analog Scale (VAS) for older children is also used to assess pain intensity if paper is available.

rFLACC (Face, Legs, Activity, Cry, Consolability)

This scale may also be used in preverbal, nonverbal, and cognitively impaired children.

Criteria	Score 0	Score 1	Score 2
Face	No particular expression or smile	Occasion grimace or frown, withdrawn, uninterested	Frequent to constant quivereing chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting, back and fourth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort

1. Rate child on each of the five categories on the 0 to 2 scale.
2. Add the scores together (for a total possible score of 0 to 10).
3. Document the total pain score.

In children who are awake: Observe for 1-5 minutes or longer. Observe legs and body uncovered. Reposition child or observe activity. Assess body for tenseness and tone. Console the child if needed.

In children who are asleep: Observe for 5 minutes or longer. Observe body and legs uncovered. If possible, reposition the child. Touch the body and assess the tenseness and tone.

Interpreting the score

0 = Relaxed and comfortable
1 – 3 = Mild discomfort
4 – 6 = Moderate pain
7 – 10 = Severe pain or discomfort or both

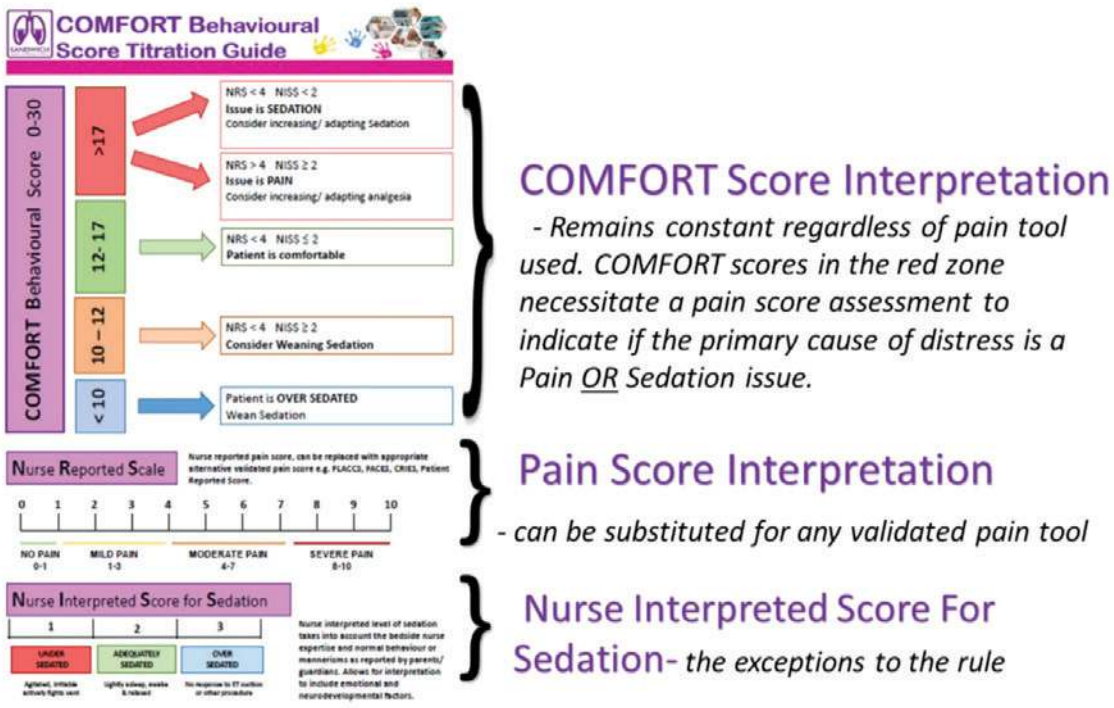
Comfort B Score

This scale can be used to assess sedation and comfort with non-verbal children, Trisomy 21, and other genetic conditions. It is not useful in the presence of neuromuscular blockers. It may be used in the pediatric ICU and the post operative setting. There has been only moderate interobserver reliability.

COMFORT B Score

Alertness	1 - Deeply asleep (eyes closed, no response to changes in environment) 2- Lightly asleep (eyes mostly closed, occasional responses) 3 - Drowsy 4 - Awake & alert 5 - Awake & hyper-alert	How responsive is the patient to the ambient light, sound and activity around them? Monitors, phones, talking
Calm/ Agitation	1 – Calm 2 - Slightly anxious 3 - Anxious 4 - Very anxious 5 - Panicky	How would you rate the patient's level of anxiety?
Respiratory response *(Intubated & ventilated)*	1 - No spontaneous respiration, no cough 2 - Spontaneous breathing no resistance to ventilator 3 – occasional cough or resistance to ventilator 4 - Actively breathes against ventilator or coughs 5 - Fights ventilator coughing or choking	How comfortable and compliant is the patient with ventilation via ET tube?
Respiratory response *(crying & self ventilated)*	1 – Quiet breathing, no crying sound 2 – Occasional sobbing or moaning 3 – Whining or monotonous sound 4 – Crying 5 – Screaming or shrieking	How would you score the intensity of verbal response? *Significance should be given to the characteristics of the cry not to the presence of tears*
Physical Movement	1 - No movement 2- Occasional (three or fewer) slight movements 3 - Frequent, (> 3) slight movements 4 - Vigorous movements limited to extremities 5 - Vigorous movements include torso & head	What is the intensity & frequency of the patient's movements?
Muscle Tone	1 - Muscles totally relaxed; no muscle tone 2 - Reduced muscle tone; less than normal 3 - Normal muscle tone 4- Increased muscle tone, increased flexion of fingers & toes 5- Extreme muscle rigidity & flexion of fingers & toes *In cases of complex needs/CP/underlying neuromuscular condition assess with a parent for the 1st assessment.*	How does the patient's muscle tone compare to a normal awake & alert child of the same age/stage of development? Flex /extend limb. *(Assess this section last)*
Facial Muscles	1 – Facial muscles totally relaxed 2 – Normal facial tone 3 – Tension evident in some muscles (not sustained) 4- Tension evident throughout muscles (sustained) 5- Facial muscles contorted and grimacing	How does the patient's facial movement/ tension compare to that of an awake & alert child of the same age/stage of development?

POCKET GUIDE Comfort B Explanation v2.0 Final 10TH September 2018



NCCPC (Non-communicating Children's Pain Checklist):

The NCCPC was developed to assess pain in children with severe neurodevelopmental disabilities and may also be used to assess postoperative pain. www.community-networks.ca/wp-content/uploads/2015/07/PainChklst_BreauNCCPC-R2004.pdf

PROMIS (Patient-Reported Outcomes Measurement Information System)

The PROMIS pediatric measures were developed to compare scores longitudinally across diverse pediatric groups. The PROMIS Pediatric Pain Interference (PPI) scale assesses functional impairment in physical, psychological, and social functioning. The pain Interference scale can help individuals determine to what level pain limits their engagement in several activities including social, cognitive, physical, and recreational activities. https://commonfund.nih.gov/promis/index

Summary:

Pain is the fifth vital sign. Healthcare providers should regularly document pain scores as part of their patient assessment. Family caregivers can also document pain scores, being attentive to significant changes. This helps direct treatment and inform caregivers about the trajectory of the child's condition.

Resources

NAS:

Timpson W, Killoran C, Maranda L, Picarillo A, Bloch-Salisbury E. A Quality Improvement Initiative to Increase Scoring Consistency and Accuracy of the Finnegan Tool: Challenges in Obtaining Reliable Assessments of Drug Withdrawal in Neonatal Abstinence Syndrome. Adv Neonatal Care. 2018 Feb; 18(1): 70–78.

Neonatal Pain

Campbell-Yeo M, Eriksson M, Benoit B. Children (Basel). 2022 Feb; 9(2): 244. Excellent review of available pain assessment tools.

CRIES calculator. https://www.mdapp.co/cries-pain-scale-calculator-566/ (open access)

Grunau RV, Craig KD. Pain Expression in Neonates: Facial Action and Cry. *Pain*. 1987; 28:395–410. (NFCS)

Hillman B, Tabrizi M, Gauda EB, et. al. The Neonatal Pain, Agitation and Sedation Scale and the bedside nurse's assessment of neonates. J Perinatol. 2015 Feb; 35(2): 128–131.

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Pain Management

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Introduction and Background[1-3]

- Pain is defined by the International Association for the Study of Pain (IASP) as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage."[4]
- Pain's subjective nature is described by the definition "Pain is whatever the experiencing person says it is, existing whenever he or she says it does."[5]
- Clinicians must acknowledge both physical and nonphysical factors (psychological, emotional, behavioral, cognitive, spiritual, existential, and cultural) that might contribute to pain perception. Children may have emotional responses to pain including fear, anxiety, anger, and sadness.
- Both chronic and acute pain can lead to sleep disturbance, depression, and anxiety, which then leads to increased pain perception.
- Healthcare providers should realize that some children can clearly describe their pain, while others may only show changes in behavior as clues to their suffering.

Figure 1. Classification of Common Pain Types based on Pathophysiology[2,6]

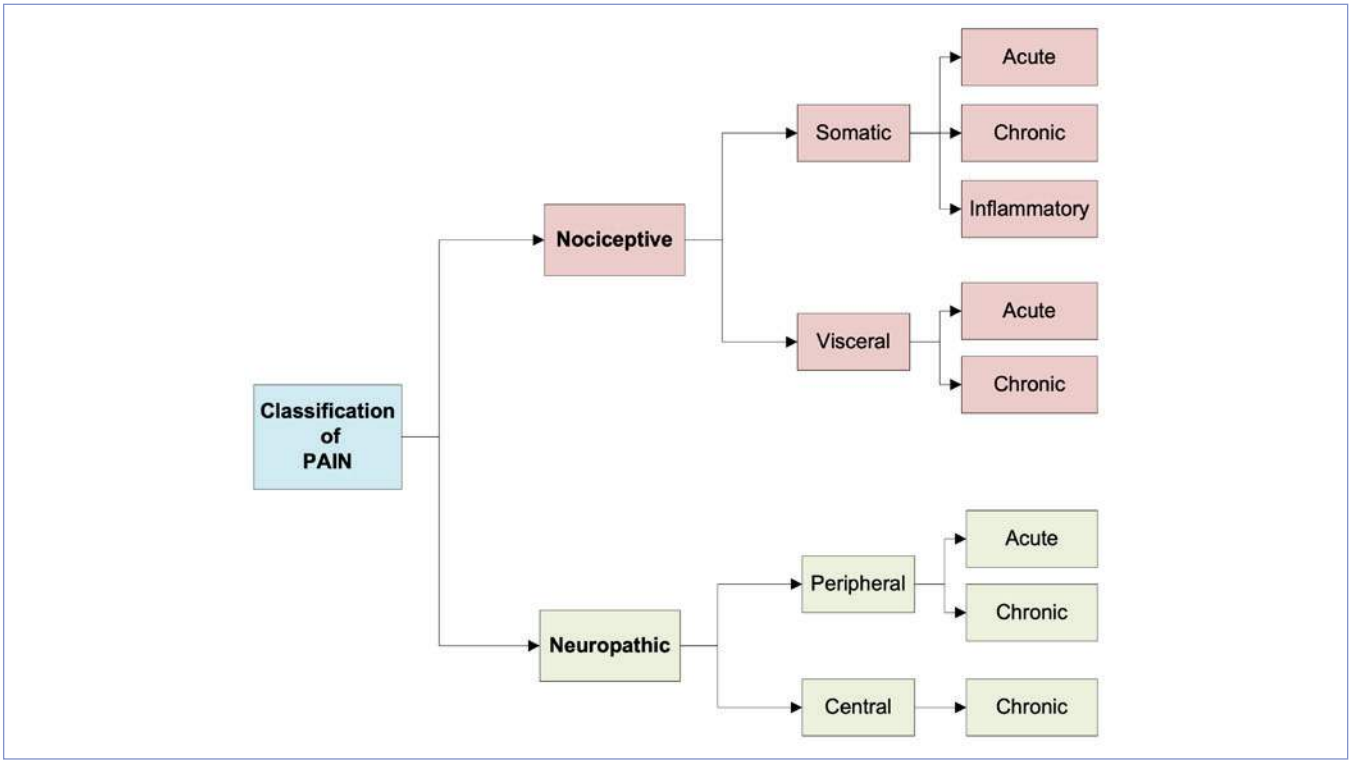

Table 1. Description of Pain Types[8]

Pain Type	Pathology	Divisions	Descriptions
Nociceptive pain	Nociceptors stimulated following injury or tissue damage Nerve impulse is generated and conveyed by neurons to the brain	▮ Somatic Pain arises from bone, joints, muscles, skin, and connective tissue. ▮ Visceral Pain arises from internal organs or their covering (peritoneum, pericardium, parietal pleura) being stretched or obstructed. This pain is usually less well defined and poorly localized or referred.	▮ Somatic Pain is usually well defined and localized. ▮ Gnawing, cramping, colicy, diffuse, and poorly localized. ▮ Achy, sharp or throbbing pain. ▮ Nausea, vomiting, and diaphoresis often accompany visceral pain.
Neuropathic pain	Abnormal processing of nerve impulses caused by a lesion or dysfunction within the nervous system	▮ Centrally-generated neuropathy is due to processing abnormalities within the CNS. ▮ Peripherally-generated neuropathy is the result of abnormalities in processing of peripheral pain sensations with no clear nerve injury or lesion.	▮ Continuous (deep, burning, aching) ▮ paroxysmal (sudden, lancinating, electric shocks or sharp stabs) ▮ tingling, "pins and needles," or "creepy-crawly" (paresthetic)

Table 2. Neuropathic Conditions Seen in Children[1,4]

Causes	Examples
Autoimmune & degenerative neuropathies	Guillain-Barre, Charcot-Marie-Tooth disease
Complex regional pain syndromes (CRPS)	Formerly known as reflex sympathetic dystrophy or causalgia
Hereditary neurodegenerative disorders	Fabry disease
Mitochondrial disorders	NARP (neuropathy, ataxia, retinitis, ptosis), MNGIE (myoneurogenic gastrointestinal encephalopathy)
Oncologic	Tumor invasion of the nerve, chemotherapy
Primary erythromelalgia	Formerly known as Mitchell's disease, acromelalgia, red neuralgia, or erythermalgia
Toxic & metabolic neuropathies	Lead, mercury, infection, alcohol
Traumatic nerve damage	Phantom limb pain, spinal cord injury, postoperative, pathological fracture

List not all inclusive

Clinical Characteristics

- Many neurotransmitters have a role in pain pathways (Table 3).
- Infants have an underdeveloped nervous system, and therefore, are more likely to have an exaggerated response to painful stimuli.
- As infants continue to undergo painful stimuli, they are at increased risk for creating a long-term increased sensitivity to painful stimuli.
- Children may express pain differently depending on their developmental level (Table 4). For example, children with developmental disabilities may exhibit pain through self-injury. Parents of these children should be encouraged to develop a specific pain scale for their child.

Table 3. Neurotransmitters Involved in Pain Pathways[8]

Neurotransmitter	Description
Acetylcholine	▮ Excitation of neurons in muscles and endocrine glands ▮ Neuromuscular and neuroglandular junctions
Glutamate	▮ Excitation of neurons in the central nervous system (CNS)
Gamma-aminobutyric acid (GABA)	▮ Inhibition of neuronal receptors in the CNS
Substance P	▮ Excitation of neurons ▮ Main neurotransmitter within the dorsal horn of the spinal cord
Noradrenaline	▮ Either inhibition or excitation of neurons ▮ Concentrated in the brainstem
Serotonin	▮ Inhibition of neurons ▮ Concentrated in the brainstem and is involved in the regulation of temperature, sensory perception, sleep and mood
Dopamine	▮ Inhibition of neuronal receptors in dendrites ▮ Concentrated in the midbrain and is involved in the regulation of emotional responses and subconscious movements of the skeletal muscles

Table 4. Developmental Differences in Pain Expression2,6

Developmental Group	Expressions of Pain	
Infants	▮ Body rigidity ▮ Thrashing or arching ▮ Facial expressions (eyes closed, avoiding eye contact, mouth open, grimacing, furrowing brows) ▮ Intense, loud crying ▮ Inconsolable, irritable	▮ Quivering chin ▮ Knees drawn to chest ▮ Hypersensitivity ▮ Poor oral intake; difficulty sucking ▮ Difficulty sleeping
Toddlers	▮ Intense crying ▮ Verbally aggressive ▮ Regressive behavior ▮ Withdrawn ▮ Facial expressions (eyes closed, avoiding eye contact, mouth open, grimacing, furrowing brows) ▮ Guard area of body	▮ Physical resistance, push painful stimulus away ▮ Irritable ▮ Restless ▮ Decreased interest in play ▮ Difficulty sleeping
Young Children	▮ Verbalize pain intensity ▮ Facial expressions (eyes closed, avoiding eye contact, mouth open, grimacing, furrowing brows) ▮ Thrashing extremities ▮ Push painful stimulus away prior to application	▮ Uncooperative ▮ Need physical restraint ▮ Cling to parent, nurse or another significant person ▮ Request emotional support (hugs, kisses, etc.) ▮ Difficulty sleeping
School-Age Children	▮ Verbalize pain ▮ Objectively measure pain ▮ Influenced by cultural beliefs ▮ Experience nightmares related to pain ▮ Utilize stalling techniques	▮ Muscle rigidity (clenched fists, white knuckles, gritted teeth, contracted limbs, body stiffness, closed eyes, wrinkled forehead) ▮ Facial expressions (eyes closed, avoiding eye contact, mouth open, grimacing, furrowing brows) ▮ Difficulty sleeping
Adolescents	▮ Localize and verbalize pain ▮ Deny pain in presence of peers ▮ Decreased interest in friends or family ▮ Decreased activity level ▮ Changes in sleep pattern or appetite	▮ Influenced by cultural beliefs ▮ Exhibit muscle tension ▮ Regressive behavior (in presence of family) ▮ Difficulty sleeping

Assessment[2-3,6--7,11, 13-18]

- Pediatric pain assessment is met with several unique challenges:
  - Self-reporting of pain is less common in pediatric patients
  - Response to pain in children may not mimic adult physiologic processes
  - Developmental impairments may hinder patients' ability to communicate presence or intensity of pain
- The family, caregivers, and child should all be included in pain assessment.
- One common process for pain assessment is the PQRSTU model (Table 5), but it might be hindered in children due to their developmental or communication level.

Table 5. PQRSTU Model for Pain Assessment7, 19

P	Provokes	▮ Aggravating or alleviating factors ▮ What causes pain? What makes pain better?
Q	Quality	▮ Let the patient describe the pain, depending on their developmental and communication level ▮ Utilize pain words appropriate for children ▮ Sharp, dull, stabbing, burning, crushing, etc.?
R	Radiates	▮ Does the pain go anywhere? Where does it start and where does it go (e.g. shoulder to hand)?
S	Severity	▮ Average, worst, least, currently ▮ At rest and with activity or stimulation
T	Time	▮ Onset and duration ▮ When did the pain start? How long does it last?
U	You	▮ What is the pain preventing the patient from doing that they would like to do? ▮ How is pain impacting patient's quality of life?

- Complete physical exam can help establish a relationship between the pain and the disease process.
- Considerations when assessing pain in children include:
  - Chronological age
  - Developmental stage
  - Type of pain (acute, chronic, procedural, neuropathic)
  - Underlying cause(s) of pain
  - Neurologic impairment
  - Chronic illness
  - Language barriers
  - Emotional, psychosocial, cultural and spiritual components
- Behavioral observation may be useful in pre-verbal or nonverbal patients. However, behaviors should be interpreted carefully. Pain will be expressed differently depending on the patient's age and developmental level (Table 4). Some behaviors may be used as a distraction method for coping with pain. For example, a child sleeping or playing may still be experiencing pain.
- If possible, establish pain-controlled behavior baseline. Assess pain at rest and during activity.

Non-Pharmacological Therapy[11,18]

- Non-pharmacological therapies are essential in chronic pain management.
- Physical, complementary, and cognitive behavioral interventions reduce the perception of pain and can decrease the dosage requirements of medication.
  - Active/passive dance
  - Acupressure, acupuncture, healing touch
  - Art, music (drumming), aromatherapy, or pet therapy
  - Biofeedback
  - Containment
  - Distraction, guided imagery, relaxation
  - Environmental modification, explanations, familiar objects
  - Heat/cold application
  - Humor, clown therapy
  - Hypnosis
  - Journaling
  - Kangaroo care, swaddling, positioning
  - Massage or therapeutic touch
  - Oral-motor stimulation (pacifiers/non-nutritive sucking)
  - Physical or occupational therapy
  - Progressive muscle relaxation
  - Storytelling
  - Therapeutic play
  - Transcutaneous electrical stimulation (TENS)

Pharmacotherapy [1-2, 6, 11, 15, 18, 35-36]

- Medications should be used in conjunction with age-appropriate non-pharmacological therapies, which can reduce the perception of pain and decrease dosage requirements.
- Pain management in children should be: [6,37]
  - based on the patient's pain level
  - given around the clock for chronic pain
  - given by the least invasive route
  - tailored to the individual child's circumstance and needs
- Before initiating therapy, the following factors should be assessed:
  - Complete medical history
    - History of gastritis, ulcers, GI bleeding, or thrombocytopenia
    - Presence of liver or renal dysfunction (Table 6)
      - Medications may need dosage adjustment
    - Disease progression
    - Associated symptoms: nausea, anorexia, sleep disturbances
    - Sources of pain: neuropathic, bone, visceral, intracranial pressure, muscle spasms
    - Medication allergies
    - Current medications for potential drug interactions
    - History of medication misuse or substance abuse in patient or family
  - Ease and appropriateness of schedule
    - Parent/caregiver adherence to around the clock dosing
  - Ease and appropriateness of route (Table 7)

Table 6. Opioid Choice Based on Organ Failure[39-42]

	Preferred	Consider	Avoid
Hepatic Failure	HYDROmorphone morphine methadone	oxyCODONE fentaNYL	codeine HYDROcodone meperidine traMADol
Renal Failure	fentaNYL methadone oxyCODONE	HYDROmorphone HYDROcodone	morphine codeine traMADol meperidine
Hepato-renal Syndrome	HYDROmorphone methadone	fentaNYL oxyCODONE	morphine codeine traMADol HYDROcodone meperidine

- Opioids should be started at the lowest dose and titrated judiciously. Starting doses listed are for opioid naïve patients (Table 10). Individualize doses based on patient assessment. In most situations, do not exceed the usual adult starting dose. Titrate doses to maximize pain relief and minimize side effects. Children may need higher doses at end of life to maintain adequate pain control.[35]
- Breakthrough and incident pain should be treated with 10-15% of the daily maintenance dose. Frequency of breakthrough dosing depends on route of administration and medication. Short acting opioids should be used for breakthrough pain.
- If patient is experiencing unrelieved pain or receiving 3-4 breakthrough doses per day, the maintenance dose should be increased by 25-50%. [36-48]

- Pain management should be reassessed on a regular basis.
- When converting from one opioid to another, always consider equianalgesic doses (Table 8). Oral morphine equivalent information is mostly adult data but may be used in children as well.
- Neonates eliminate opioids more slowly than adults, but elimination reaches and exceeds adult levels within the first year of life. For example, children less than 11 years of age have significantly higher morphine clearance and volume of distribution compared to adults.[53]
- Race may alter pharmacokinetics of opioids in children. For example, African American children have higher morphine clearance than Caucasian children.[54]
- Codeine and codeine-containing products should be avoided in pediatric patients due to the highly variable pharmacokinetics and side effects, as well as lack of evidence and safety.[56-57] Codeine is routinely converted to morphine by the CYP2D6 enzyme in the liver. People can have varying degrees of CYP2D6 activity. Poor metabolizers are deficient in CYP2D6 and have inadequate therapeutic response from codeine. On the other hand, people with higher than normal CYP2D6 activity, considered ultra-rapid metabolizers, may have supratherapeutic response and increased risk of adverse reactions.[58] The FDA does not recommend the use of codeine in children, specifically following tonsillectomy and/or adenoidectomy, due to reports of respiratory depression and death.[59]
- Aspirin is typically avoided for pain management in children due to the risk of Reye's syndrome.

Table 7. Medication Route Considerations[11, 35-36]

Route	Considerations
Oral & feeding tube	▮ Painless ▮ Typically preferred by children ▮ Consider taste ▮ Easy to titrate ▮ Not recommended in patients with bowel obstruction ▮ Difficult to tolerate in patients with nausea or vomiting ▮ Lack of available liquid options may limit use
Sublingual	▮ Painless ▮ May need to mix with liquid if patient has dry mouth ▮ Consider volume of liquid ▮ Not all medications are absorbed sublingually; dose may trickle back, swallowed with saliva
Transdermal	▮ Painless ▮ Patient must be opioid tolerant ▮ Difficult to titrate ▮ Patch cannot be cut or folded ▮ May have increased absorption in febrile patients or young children ▮ Requires another opioid for breakthrough pain ▮ Approximately 12 hours for onset of analgesia ▮ Buprenorphine (Butrans) patch not approved in children
Intravenous	▮ Rapid pain control ▮ Easiest to titrate and adjust quickly ▮ Useful if severe vomiting, mucositis, bowel obstruction, or questionable GI absorption ▮ Use lidocaine gel or cream prior to inserting new IV line or accessing port ▮ Invasive; may require equipment and electricity (if used in home, must consider alternative if loss of power) ▮ Bolus dosing may have increased side effects (especially itching & vomiting), shortest duration, shortest frequency, increased risk of pseudoaddiction

Route	Considerations
Patient Controlled Analgesia (PCA)[43-46]	▮ Eliminates time between pain perception and relief ▮ Can provide basal maintenance rate, as well as breakthrough doses ▮ Requires patient understanding of the relationship between pushing the button and pain relief (typically >7 yoa) ▮ Parents should be educated not to push button for their sleeping child ▮ Maximum amounts can be set to minimize the risk of overdose ▮ Breakthrough doses received should be monitored on a regular basis and maintenance dose adjusted as appropriate ▮ Requires equipment and electricity (if used in home, must consider alternative if loss of power)
Subcutaneous[47]	▮ Small and portable pump ▮ Can be used for continuous infusion or PCA ▮ Bioavailability may be affected by fat, muscle, and water composition in children ▮ Use lidocaine gel or cream prior to insertion ▮ Minimize volume to minimize discomfort (max volume: typically 2 mL; may vary based on location and child)
Rectal	▮ Consider patient preference and privacy ▮ Wide variability in therapeutic blood levels ▮ Useful when unable to swallow or significant vomiting ▮ Use caution in neutropenic or thrombocytopenic patients
Intramuscular	▮ Typically avoided ▮ Painful ▮ Wide fluctuations in absorption since decreased muscle mass in children ▮ Requires adequate blood flow to the injection site to ensure absorption ▮ Minimize volume to minimize discomfort (max volume: neonates= 0.5 mL, infants= 1 mL, children= 2 mL, adolescents= 3 mL)
Epidural	▮ Short term use or may be tunneled subcutaneously ▮ Use only if consistent with child and family goals ▮ Maximize use of less invasive route first ▮ May be beneficial for uncontrolled neuropathic pain, severe lower extremity pain, or if intolerable side effects from systemic analgesia

Table 8. Opioid Equianalgesic Dosing & Pharmacokinetics

Generic	Brand Names	SQ/IV	PO	PR	Onset (min)	Duration (hr)	Half-life (hr)
PREFERRED for Chronic Pain Management							
morphine sulfate	Roxanol	10 mg	30 mg	30 mg	10-20	4	2
HYDROmorphone	Dilaudid	1.5 mg	7.5 mg	7.5 mg	10-20	4	2-3
oxyCODONE	Oxy IR, Percocet*, Tylox*, Percodan†	-	20 mg	20 mg	30-60	4	2-3
HYDROcodone	Vicodin*, Lortab*, Lorcet*, Vicoprofen‡	-	30 mg	30 mg	30-60	4	30-60
oxymorphone	Opana, Opana ER	1 mg	10 mg	10 mg	5-15	4-6	9-11
fentaNYL transdermal	Duragesic Transdermal	**ORAL MORPHINE EQUIVILANT** 100 mcg/hr ≈ morphine 200 mg/24 hrs 75 mcg/hr ≈ morphine 150 mg/24 hrs 50 mcg/hr ≈ morphine 100 mg/24 hrs 25 mcg/hr ≈ morphine 50 mg/24 hrs 12.5 mcg/hr ≈ morphine 25 mg/24 hrs			12-18 hr	48-72	2-4
NOT Recommended for Chronic Pain Management							
codeine		130 mg	200 mg	200 mg	10-20	3 - 4	3
butorphanol	Stadol	2 mg	-	-	5-10	3 - 4	2.5-4
levorphanol	Levo-Dromoran	2 mg (acute) 1 mg (chronic)	4 mg (acute) 1 mg (chronic)	4 mg	10-60	5-4	11-16
meperidine[49-52]	Demerol	100 mg	300 mg	300 mg	10-20	2 - 4	2-4
nalbuphine	Nubain	10 mg	-	-	2-15	3-4	1-5
pentazocine	Talwin	30 mg	50 mg	-	2-30	3–4	2-12

**combination product with acetaminophen; † combination product with aspirin; ‡ combination product with ibuprofen*

- All opioids have black box warnings:[42]
  - Extended or sustained release dosage forms should not be crushed or chewed.
  - Long-acting opioids are indicated for the management of moderate to severe pain when around the clock pain control is needed.
  - Opioids should not be administered with alcohol.
  - Healthcare providers should be alert to potential abuse, misuse, or diversion of opioids.
- Side effects should be monitored for and prevented if possible. Common side effects of opioids include constipation, nausea and vomiting, itching, transient sedation, dry mouth, and sweats. Tolerance does not develop to the constipating effects of opioids. Therefore, patients should be started on a preventative bowel regimen when scheduled opioids are initiated. Less common side effects include hallucinations, dysphoria, myoclonus, pruritus, respiratory depression, and urinary retention.2,36,55 Parents should be counseled regarding potential side effects and the potential for increased sleep initially once pain is controlled.
- Respiratory depression, although uncommon with proper dosing, may occur if a patient is opioid naïve, in combination with other respiratory depressant drugs, or when overdose occurs. In the case of significant respiratory depression, naloxone (Narcan) may be administered.

- Opioid-induced neurotoxicity (Table 9) is a possible side effect dependent on both the dose and duration of therapy. Neurotoxicity is possible with all opioids but is seen most commonly with morphine or HYDROmorphone due to the accumulation of the morphine-3 glucuronide and HYDROmorphone-3 glucuronide metabolites. In cases of neurotoxicity, increasing the dose typically exacerbates the excitatory behaviors. After tapering the offending opioid, symptoms usually resolve over hours to days as the offending metabolite clears.2,36 Treatment of neurotoxicity includes tapering the dose, rotating to a structurally different opioids, hydrating the patient if appropriate, and treating specific symptoms, such as delirium or myoclonus.
- When discontinuing opioids that have been used for greater than three weeks, the dose should be tapered by decreasing about 20% every other day. Patient should be monitored for signs and symptoms of withdrawal (e.g., tachycardia, agitation, anxiety, myoclonus, insomnia, sweating, nausea, vomiting, dilated pupils, etc.).

Table 9. Opioid-Induced Neurotoxicity[2]

Precipitating Factors	▮ Underlying delirium ▮ Dehydration ▮ Acute renal failure ▮ Concurrent psychoactive medications: benzodiazepines, tricyclic antidepressants
Incidence	▮ Unusual at typical doses (generally seen at higher doses) ▮ Renal insufficiency ▮ Morphine > HYDROmorphone
Signs and Symptoms	▮ Myoclonus ▮ Delirium ▮ Hallucinations ▮ Seizures ▮ Hyperalgesia ▮ Allodynia
Treatment Options	▮ Taper opioid dose ▮ Rotate to a structurally dissimilar opioid ▮ Hydrate (if appropriate) ▮ Treat specific symptoms (e.g., haloperidol for delirium or LORazepam for myoclonus)

Somatic Pain[1-2,11,36]

- CloNIDine, an alpha-2 agonist, may be beneficial for treating somatic pain since it reduces central sympathetic output and increases firing of inhibitory neurons on descending pain pathways. Epidural administration has been studied the most frequently. CloNIDine may cause sedation and hypotension, especially at higher doses, but it typically does not impair respiration.[8]

Visceral Pain

- Corticosteroids may be indicated first line in cases of pleuritic chest pain, capsular stretching, or inflammation. The anti-inflammatory effects of corticosteroids make them a beneficial adjuvant to opioids in the treatment of pain that results from visceral stretching.
- Although anticholinergic agents such as hyoscyamine and scopolamine effectively treat colic, they can contribute to constipation. Encourage patients to drink plenty of fluids and increase their fiber intake to balance benefits and the constipating effects of these agents.
- In pancreatic disease or steatorrhea (fatty stool), consider pancreatic lipase enzymes, celiac plexus block, or jejunal feeding below the sphincter of oddi for pain control.

Neuropathic Pain[1-2,18,97-101]

- Management of underlying causes should be considered if appropriate with patients' goals of care.
- Both systemic and topical drugs can be useful in managing neuropathic pain.
  - **Antidepressants**[102-107]
    - Tricyclic antidepressants (TCAs) are first line therapy for neuropathic pain in adults. TCAs may potentiate the effects of opioids, provide mood elevation, and help with sleep disturbances.
    - All antidepressants have a black box warning for worsening depression and suicidal ideation in children and young adults.
    - Onset is typically 2-5 days and may take up to 3 weeks for maximal effect.
    - Doses are typically ⅓ to ½ of depression doses.
    - Both norepinephrine and serotonin levels must be increased to effectively treat neuropathic pain, therefore, selective serotonin reuptake inhibitors (SSRIs) are not indicated for the treatment of neuropathic pain. Serotonin-norepinephrine reuptake inhibitors (SNRIs), such as venlafaxine (Effexor), may have benefit in neuropathic pain.
  - **Antiepileptic drugs** (AEDs)
    - An AED may be used as first line therapy in patients unable to tolerate a TCA. When used as second line therapy, the AED should be added to the TCA.
    - Gabapentin (Neurontin) has the most evidence for use in pediatrics97 and the least side effects.
  - **Opioids**[99]
- Although higher doses may be needed to treat neuropathic pain, opioids can be effective.
- **Opioids** are typically used in combination with other therapies for neuropathic pain.
- **Methadone** has the unique property of blocking the N-methyl-D-aspartate (NMDA) receptor and has therefore been reported as the most effective opioid for neuropathic pain.
- **TraMADol** (Ultram) is a weak mu agonist and weak norepinephrine-serotonin reuptake inhibitor. The synergistic effects of these two mechanisms contribute to the effectiveness of this agent in neuropathic pain. TraMADol should not be discontinued abruptly, as it can cause withdrawal symptoms.
  - **Lidocaine, topical**[108-110]
    - Topical lidocaine has been shown effective in adults for diabetic neuropathy, postherpetic neuralgia, trauma, and neuropathic back pain. However, there is currently a lack of safety and efficacy data in pediatric patients.16 Lidocaine patch is currently not FDA approved for use in pediatric patients.
    - Systemic levels are very low and side effects rare. Minor local irritation at the application site can normally be managed with hydrocortisone cream.
    - Patches are normally placed directly over the painful area and left on for 12 hours a day, then removed for 12 hours before another patch is applied.
    - Lidocaine patches might be considered first line therapy if the neuropathic pain is in a small area of nerve distribution since one patch can be cut before the backing is removed and placed over the area of pain.
    - In situations where pain is caused by tissues of neurogenic origin, such as neurofibromas, neuroblastoma, or Ewing's sarcoma, lidocaine patch may be particularly beneficial.[1]
    - Lidocaine patch therapy may be added to TCA and/or AED therapy. These agents all work by different mechanisms so multiple drug use is synergistic.
  - **Capsaicin, topical**
    - Capsaicin cream or solution is the only consistently useful topical agent for neuropathic pain since it depletes the pain facilitating chemical Substance P from sensory nerves.
    - Topical capsaicin is a potentially useful adjunct to the therapies listed above. However, capsaicin requires three to four weeks to work and must be applied four times daily for full effect; therefore, it is not typically a primary treatment.
    - Initially this drug causes irritation and burning at the application site; this effect normally lessens within a few days to a week. This burning sensation may limit its use in young children. A topical anesthetic can be applied prior to applying capsaicin to decrease the burning sensation.
    - Patients/families must be instructed to use gloves or wash carefully after use; touching mucous membranes or eyes can cause severe local pain.
    - Capsaicin 0.025% topical lotion (DiabetAid®) is FDA approved in patients greater than 2 years of age. An entire container of low strength lotion (0.025%) should be used before switching to the high strength (0.075%).

- **NMDA antagonists**
  - This class of medications is associated with significant adverse events and should be used only by experienced clinicians.
  - Methadone
  - Ketamine (Ketalar)[111-113]
    - Subanesthetic doses may improve pain control and have an opioid-sparing effect.[114]
    - Serious side effects include hallucinations and emergence reactions.

Table 10. Pharmacological Management of Pain[2, 42,86]

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Somatic Pain			
Non-opioids			
acetaminophen (Tylenol) IV: >2 yoa	**<12 yoa:** 10-15 mg/kg (10-20 mg/kg PR) q4-6h **Max:** 2.6 g/day or 90 mg/kg/day **≥12 yoa:** 325-500 mg q4-6h **Max:** 3 g/day	**PO** **PR** **IV**	**Solution:** 160 mg/5 mL **Tablets, chewable:** 80 mg **Tablets, ODT:** 80, 160 mg **Tablets:** 325, 500 mg **Suppository:** 80, 120, 325, 650 mg **Injection, PF (Ofirmev):** 10 mg/mL
	▮ Caution in hepatic and renal impairment ▮ Black box warning: severe hepatotoxicity ▮ Can also be utilized for fever reduction ▮ May be used in conjunction with NSAIDs or opioids		
Non-Steroidal Anti-Inflammatory (NSAIDs)[85]			
ibuprofen (Motrin) >6 mon	**4-10 mg/kg q6-8h** **Max:** 40 mg/kg/day **Adult:** 200-400 mg q4-6h **Max:** 3.2 g/day	**PO**	**Suspension:** 100 mg/5 mL **Concentrate:** 40 mg/mL **Tablets, chewable:** 100 mg [contains phenylalanine] **Tablets:** 200, 400, 600, 800 mg
	▮ Do not use in patients with aspirin sensitive asthma ▮ Long term use may increase risk of GI bleed ▮ Caution: renal and hepatic impairment, bleeding risk ▮ Take with food or milk if upset stomach		
ketorolac (Toradol) >2 yoa	**1 month- 2 yoa:** 0.5 mg/kg IV q6-8h; NTE 72 hr **2-16 yoa:** 0.5 mg/kg IV q6h; NTE 5 days **>16 yoa:** 30 mg IV q6h or 10 mg PO q6h	**PO** **IV** **IM**	**Tablets:** 10 mg **Injection:** 15, 30 mg/mL
	▮ FDA approved for single dose IV/IM in children >2 years; Oral route not approved in children ▮ Do not exceed 5 days of therapy due to side effects ▮ Warnings: ulceration, bleeding, renal impairment		
naproxen (Naprosyn) IV: >2 yoa PO: >18 yoa	**>2 yoa:** 5-7 mg/kg q8-12h **>12 yoa:** 250-500 mg q6-8h **Max:** 1,250 mg/day	**PO**	**Suspension:** 125 mg/5 mL **Tablets:** 250, 375, 500 mg
	▮ Long term use may increase risk of GI bleed ▮ Take with food or milk if upset stomach ▮ Do not use in patients with aspirin sensitive asthma		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Combination non-opioid/opioid- not generally recommended in younger children			
acetaminophen +HYDROcodone (Lortab, Norco, Vicoden) no age restrictions	**<50 kg:** 0.1-0.2 mg/kg q3-4h **≥50 kg:** 5-10 mg q4-6h **Max:** 60 mg HYDROcodone ▮ Do not exceed 3 g or 90 mg/kg acetaminophen/day	**PO**	**Solution:** 7.5/325 mg/15 mL, 7.5/500 mg/15 mL, 10/325 mg/ 15 mL **Elixir:** 7.5/500 mg/15 mL **Tablets:** 5/300 mg, 5/325 mg, 7.5/300 mg, 7.5/325 mg, 10/300 mg, 10/325 mg
	▮ Schedule III controlled substance ▮ Take with food or milk if GI upset occurs ▮ Acetaminophen warning for hepatotoxicity		
acetaminophen + oxyCODONE (Percocet, Endocet) >18 yoa	**0.1-0.2 mg/kg q4-6h** **Adult:** 2.5-10 mg q4-6h ▮ Dosed based on oxyCODONE component ▮ Do not exceed 3 g or 90 mg/kg acetaminophen/day	**PO**	**Solution:** 5 mg - 325 mg/5 mL (no generic) **Tablets:** 2.5/325, 5/325, 7.5/325, 10/325, 5/300, 7.5/300, 10/300 mg
	▮ Schedule II controlled substance ▮ Acetaminophen warning for hepatotoxicity		
Opioids			
fentaNYL (Duragesic)[60-70] 2 yoa	**IV:** 0.5-2 mcg/kg q1-2h prn **IN:** 1.5 mcg/kg once **TD:** based on oral morphine equivalents (at least 60 mg/day)	**TD** **IN** **IV**	**Transdermal:** 12.5, 25, 50, 75, 100 mcg/hr **Injection:** 0.05 mg/mL ▮ Apply patch to upper back ▮ Do not apply heat to patch ▮ If patch does not stick, first-aid tape may be applied to the edges
	▮ Schedule II controlled substance ▮ Do not use in opioid naïve patients ▮ Caution: young children, fragile skin, fever ▮ Lacks histamine release ▮ Intranasal fentaNYL might be effective for acute pain relief in children[71-74] ▮ Tolerance develops quickly with IV formulation[2]		
HYDROmorphone (Dilaudid) >6 months	**PO: >6 months (10-50 kg):** 0.03-0.08 mg/kg q4h prn **>50 kg:** 1-2 mg q3-4h prn **PR: >50 kg:** 3 mg q4-8h prn **IV: > 6 months (10-50 kg):** 0.01-0.015 mg/kg q3-6h prn **>50 kg:** 0.2-0.6 mg q2-4h prn	**PO** **PR** **SL** **IV** **SQ**	**Solution:** 1 mg/mL **Tablets:** 2, 4, 8 mg **Suppository:** 3 mg **Injection:** 1, 2, 4, 10 mg/mL
	▮ Schedule II controlled substance ▮ Semisynthetic version of morphine ▮ May have increased potential for SE		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
methadone (Dolphine) [71-81] no age data	**0.1 mg/kg q6-12h** **Adult:** 2.5mg q12h	PO SL PR IV SQ	**Solution:** 5 mg/5 mL, 10 mg/5 mL **Concentrate:** 10 mg/mL **Tablets:** 5, 10 mg **Injection:** 10 mg/mL
	▮ Schedule II controlled substance ▮ Long & variable t½; analgesia duration shorter ▮ QT prolongation and multiple drug interactions ▮ Option for neuropathic pain ▮ NMDA receptor agonist		
morphine IR (Roxanol)[87-94] no age restrictions	**PO:** 0.2-0.5 mg/kg q4-6h prn **IV/IM/SQ:** 0.1-0.2 mg/kg q2-4h prn **Adult:** 2.5-5 mg q4h prn **Infant:** 25-35% of normal dose	PO SL PR[95] IV IM SQ	**Solution (Roxanol):** 10 mg/5 mL; 20 mg/5 mL; 20 mg/mL **Tablets (MSIR):** 15, 30 mg **Suppository:** 5, 10, 20, 30 mg **Injection:** 1, 2, 4, 5, 8, 10, 15, 25, 50 mg/mL **Injection [PF]:** 0.5, 1, 25 mg/mL ▮ Administer IVP over at least 5 minutes
	▮ Schedule II controlled substance ▮ Delayed clearance <3 months of age; more susceptible to respiratory depression ▮ Increased clearance in children 1-11 yoa53 ▮ Use caution in renal impairment ▮ Glucuronide metabolite can accumulate and cause neurotoxicity at high doses ▮ PO:IV ratio 3:1		
morphine SR (MSContin) no age data	**PO:** 0.6 mg/kg/dose q12h **Adult:** 15-30 mg q8-12h	PO PR	**Tablets:** 15, 30, 60, 100, 200 mg ▮ Do not crush
	▮ Schedule II controlled substance ▮ Caution in renal impairment ▮ Glucuronide metabolite can accumulate and cause neurotoxicity ▮ Avinza and Kadian dosed q24h		
oxyCODONE IR (Roxicodone) >18 yoa	**0.1-0.2 mg/kg q4h prn** **Max:** 20 mg **Adult:** 5 mg q4h prn	PO	**Solution (Oxyfast):** 5 mg/5 mL, 20 mg/mL **Tablets (OxyIR, Roxicodone):** 5, 10, 15, 20, 30 mg ▮ CR product not approved <18 yoa
	▮ Schedule II controlled substance ▮ Option in patients with renal dysfunction ▮ Faster clearance in children than adults[2]		
Visceral Pain			
Colicky/Cramping			
dicyclomine (Bentyl) >6 months	**>6 months:** 5 mg q6-8h **Child:** 10 mg q6-8h **Adult:** 20 mg q6h; titrate to 40 mg q6h	PO	**Syrup:** 10 mg/5 mL **Capsules:** 10 mg **Tablets:** 20 mg ▮ Syrup contains propylene glycol
	▮ Caution: children with Down's syndrome, spastic paralysis, brain injury, hepatic or renal disease		

<table>
<tr><th>Medication & Age Guide*</th><th>Typical Starting Dose**</th><th>Routes</th><th>Pediatric Formulation Considerations</th></tr>
<tr><td>glycopyrrolate
(Robinul)</td><td>PO: 40-100 mcg/kg q6-8h
Adult: 1 mg q12h
IM/IV: 4-10 mcg/kg q3-4h
Adult: 0.2 mg q6h</td><td>PO
IM
IV</td><td>Solution: 1 mg/5 mL (not generic)
Tablets: 1, 2 mg
Injection: 0.2 mg/mL
▮ Administer solution on empty stomach
▮ Oral solution may contain propylene glycol
▮ Compounding recipes using tablets available
▮ Injection contains benzyl alcohol</td></tr>
<tr><td colspan="4">▮ Paradoxical excitation may occur in infants
▮ Caution: children with Down's syndrome, spastic paralysis, brain injury, or renal disease
▮ Least likely to cross blood-brain barrier; causes less confusion and visual changes
▮ Drying effect ~5x as potent as atropine[96]</td></tr>
<tr><td>hyoscyamine
(Levsin, Hyomax-SL)

PO: all ages
IV: >18 yoa</td><td><2 yoa:
<table><tr><th>Weight ht (kg)</th><th>Dose (drops)</th><th>Max Daily Dose (Drops)</th></tr><tr><td>5</td><td>5</td><td>30</td></tr><tr><td>7</td><td>6</td><td>36</td></tr><tr><td>10</td><td>8</td><td>48</td></tr></table>2 - 12 yoa: 0.0625-0.125 mg q4h prn
Max: 0.75 mg/day
>12 yoa: 0.125-0.25 mg q4h prn
Max: 1.5 mg/day</td><td>PO
SL</td><td>Elixir: 0.125 mg/5 mL
Solution (drops): 0.125 mg/mL
Tablets, ODT, SL: 0.125 mg
Tablets: 0.125 mg
Injection: 0.5 mg/mL
▮ Liquids may contain sodium benzoate or ethanol
▮ Disintegrating tablets contain aspartame
▮ IV not approved in children</td></tr>
<tr><td colspan="4">▮ Low doses may cause paradoxical decrease in heart rate</td></tr>
<tr><td>scopolamine
(Transderm Scōp)

>12 yoa</td><td>>12 yoa: 1 patch q3days</td><td>TD</td><td>Transdermal Patch: 1.5 mg (not generic)
▮ Apply patch to hairless area behind one ear; Do not cut patches</td></tr>
<tr><td colspan="4">▮ Approximately 12 hours to peak effect
▮ SE: drowsiness, confusion, visual changes</td></tr>
<tr><td colspan="4">Stretching/Capsule</td></tr>
<tr><td>dexamethasone
(Decadron)</td><td>0.08-0.3 mg/kg/day
Adult: 0.75-9 mg/day</td><td>PO
PR
IM
IV</td><td>Solution: 0.5 mg/5 mL (5% EtOH)
Elixir: 0.5 mg/0.5 mL (30% EtOH)
Tablets: 0.5, 0.75, 1, 1.5, 2, 4 mg
Injection: 10, 25, 50 mg/mL
▮ Oral solutions and elixirs contain alcohol, propylene glycol, and benzoic acid. May Use IV formulation orally (10 mg/mL PF).
▮ Rapid IV administration associated with perineal discomfort.</td></tr>
<tr><td colspan="4">▮ Give with food or milk to decrease GI disturbances; avoid administering later in the day due to insomnia
▮ SE: adrenal suppression, Cushing's syndrome, hyperglycemia, growth suppression, GI bleed, insomnia, hypertension, myopathy, weight gain
▮ Minimal mineralocorticoid activity
▮ Withdraw gradually after long-term therapy</td></tr>
</table>

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
prednisoLONE (Orapred)	**0.1-2 mg/kg/day divided q6-24h** **Adult:** 5-60 mg/day	**PO**	**Solution:** 5 mg/5 mL, 10 mg/5 mL, 15 mg/5 mL, 20 mg/5 mL, 25 mg/5 mL **Tablets:** 5 mg (not generic) **Tablets, ODT:** 10, 15, 30 mg (not generic) ▮ Solution may contain sodium benzoate
	▮ Give with food or milk to decrease GI disturbances; avoid administering later in the day due to insomnia ▮ Withdraw gradually after long-term therapy ▮ SE: adrenal suppression, Cushing's syndrome, hyperglycemia, growth suppression, GI bleed, insomnia, hypertension, myopathy, weight gain		
predniSONE (Deltasone)	**0. 5-2 mg/kg/day** **Max:** 60 mg/day **Adult:** 5-60 mg/day	**PO**	**Solution:** 1 mg/mL **Elixir:** 5 mg/mL (30% EtOH) (not generic) **Tablets:** 1, 2.5, 5, 10, 20, 50 mg ▮ Elixir contains propylene glycol
	▮ Give with food or milk to decrease GI disturbances; avoid administering later in the day due to insomnia ▮ SE: adrenal suppression, Cushing's syndrome, hyperglycemia, growth suppression, GI bleed, insomnia, hypertension, myopathy, weight gain		
Bowel Obstruction Colic			
octreotide (SandoSTATIN)[7-12]	**1-10 mcg/kg q8-12h** **Continuous infusion:** 0.3-10 mcg/kg/hr **Adult:** 50-100 mcg q8h **Continuous infusion:** 10-20 mcg/hr **Max:** 500 mcg	**IV SQ**	**Injection:** 50, 100, 200, 500, 1,000 mcg/mL ▮ Do not use depot formulation
	▮ Serious fatal events reported in children <2 yoa ▮ May require combination with anticholinergic and/or steroid ▮ SE: alterations of glucose/insulin requirements, QT interval prolongation		
Neuropathic Pain			
Tricyclic Antidepressants (TCA)			
amitriptyline (Elavil)[115] >12 yoa	**amitriptyline (Elavil)[115]** **>12 yoa 0.1 mg/kg qhs, titrate over 2-3 weeks to 0.5-2 mg/kg qhs** **Adult:** 25 mg qhs, titrate to 100 mg qhs	**PO**	**Tablets:** 10, 25, 50, 75, 100, 150 mg
	▮ SE: sedation, constipation, urinary retention		
nortriptyline (Pamelor) >12 yoa	**0.2-1 mg/kg/dose qhs titrated 3 mg/kg/dose or 150 mg** **Adult:** 10-25 mg qhs	**PO**	**Solution:** 10 mg/5 mL **Capsules:** 10, 25, 50, 75 mg ▮ May contain benzoic acid
	▮ Least likely TCA to cause orthostasis; generally, better tolerated ▮ Caution: renal and hepatic impairment		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Antiepileptic Drugs (AED)			
gabapentin (Neurontin) >3 yoa	**2-5 mg/kg qhs-tid; titrated over 2-4 weeks** **Max:** 10-20 mg/kg tid **Adult:** 100-300 mg qhs-tid; titrate to effect **Max:** 3,600 mg/day ▮ TID dosing necessary for neuropathic pain	**PO**	**Solution:** 250 mg/5 mL **Capsules:** 100, 300, 400 mg **Tablets:** 600, 800 mg
	▮ Not FDA approved for neuropathic pain, Limited dosing information available ▮ SE: sedation, nystagmus, hallucinations, weight gain		
carBAMazepine (TEGretol)	**<6 yoa:** 10-20 mg/kg/day divided q8-12h **6-12 yoa:** 5 mg/kg q12h; Max: 100 mg/dose **>12 yoa:** 200 mg q12h ▮ Suspension given q6h **Max:** **<6 yoa:** 35 mg/kg/day **6-15 yoa:** 1,000 mg/day **15-18 yoa:** 1,200 mg/day **Adult:** 1,600-2,400 mg/day	**PO** **PR**	**Suspension:** 100 mg/5 mL **Tablets, chewable:** 100 mg **Tablets:** 200 mg **Tablets, ER:** 200, 400 mg **Capsules, ER sprinkle:** 100, 200, 300 mg ▮ Inconsistent delivery with suspension ▮ Suspension contains sorbitol ▮ Well absorbed PR (slower); PR:PO ratio 1:1; Use IR ▮ Do not crush or chew ER tablets; Ghost tablets can be seen in stool ▮ Sprinkle formulations can clog feeding tubes
	▮ Significant drug interactions ▮ Caution: patients with compromised bone marrow function ▮ SE: anemia (potentially fatal), agranulocytosis, rash, hyponatremia, ↓bone density, teratogenic ▮ Minimize side effects by giving largest dose at bedtime ▮ Asians are at increased risk of Stevens-Johnson syndrome ▮ May exacerbate certain seizure types in children with mixed seizure disorders ▮ Serum level: 4-12 mcg/mL; Aggravation of seizures at levels >12		
pregabalin (Lyrica) >18 yoa	**Adult:** 150 mg/day divided **Max:** 100 mg TID	**PO**	**Solution:** 20 mg/mL **Capsules:** 25, 50, 75, 100, 150, 200, 225, 300 mg
	▮ Adjust dose in renal impairment ▮ SE: edema, dizziness, somnolence, thrombocytopenia, prolong PR interval, rhabdomyolysis, suicidal ideation, visual disturbances, weight gain, xerostomia		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
valproic acid, divalproex sodium (Depakene, Depakote) >2 yoa ER: >10 yoa	**10-15 mg/kg divided q8-24h** **Max:** 60 mg/kg/day **Adult:** 1,000-2,500 mg/day divided q8-24h ▮ Increase dose by 5-10 mg/kg/day weekly ▮ May require higher doses as adjunctive therapy ▮ Total IV daily dose is same as oral dose divided q6h	PO PR IV	**valproic acid:** **Syrup:** 250 mg/5mL **Capsules:** 250 mg **Capsules, ER:** 125, 250, 500 mg **Injection:** 100 mg/mL **divalproex sodium:** **Capsules, sprinkle:** 125 mg **Tablets, EC:** 125, 250, 500 mg **Tablets, ER (24h):** 250, 500 mg ▮ Sprinkles may be mixed with semisolid food. Do not crush or chew sprinkle beads. Sprinkles can clog feeding tubes. ▮ Depakote ER not recommended < 10 yoa ▮ Depakote & Depakote ER not bioequivalent ▮ PR: PO ratio 1:1 using liquid
	▮ ↑ risk of hepatotoxicity in < 2 yoa ▮ Contraindication: liver dysfunction, urea cycle defect ▮ Significant drug interactions (more pronounced in children) ▮ SE: weight gain, menstrual irregularities, polycystic ovarian syndrome, thrombocytopenia, rash, encephalopathy, hyperammonia, pancreatitis, tremor, hair loss		
Atypical Opioid-Monoamine Reuptake Inhibitor Analgesic			
traMADol (Ultram, Rybix ODT) >4 yoa	**4-16 yoa:** 1-2 mg/kg/dose q4-6h **Max:** 100 mg/dose; 8 mg/kg/day or 400 mg/day **>16 yoa:** 50-100 mg q4-6h **Max:** 400 mg/day	PO	**Tablets, ODT:** 50 mg (not generic) **Tablets:** 50 mg ▮ ODT contains aspartame ▮ Schedule IV controlled substance in some states
	▮ Opioid agonist with serotonin reuptake inhibition. Risk of serotonin syndrome when used with other serotonergic medications ▮ Increased seizure risk, even with recommended dose ▮ Avoid use in suicidal patients, renal or hepatic impairment ▮ No evidence for chronic or palliative care use ▮ Avoid abrupt discontinuation; withdrawal symptoms		

**Use cautiously in patients outside of FDA and manufacturer recommended age parameters. ** Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

Excerpted from Hunt MO, Protus BM, Winters JP, Parker DC. Pediatric Palliative Care Consultant: Guidelines for Effective Management of Symptoms. Montgomery, Al: HospiScript; c2014. p. 193-225.

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The Controversy of Fetal Pain in Perinatal Palliative Care

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Perinatal palliative care is an expanding area of clinical expertise that involves comprehensive care planning for pregnancies complicated by potentially life limiting conditions.[1] Over the past years, there has been increasing awareness of the importance of this care strategy with increased identification of families that may benefit from it. In the United States in 2021, there were 19,928 infant deaths (before the age of 1), correlating with an infant mortality rate of 5.4 per 1000 live births. The neonatal mortality rate (before 28 days) was 3.4 per 1000 live births.[2] For both neonatal and infant deaths, the leading cause in the United States is congenital malformations. Advancing technologies have enhanced prenatal diagnosis of many severe anomalies, allowing greater prenatal identification of potential perinatal palliative care needs. The second most common cause of infant death is preterm birth or low birth weight, increasing relevance of evolving definitions of the limits of viability and providing additional opportunities for perinatal palliative care.

The overall approach in perinatal palliative care balances patient values and quality of life with the goal of minimizing suffering and treating total pain. "Total pain" was defined by Cicely Saunders, considered the grandmother of palliative medicine, to include somatic pain but also existential, spiritual, psychological and practical suffering.[3] The holistic treatment of total pain requires models that are multifaceted and aim to create

harmony between management of the maternal and fetal patients. One of the key components to perinatal palliative care is providing transparent comprehensive counseling that involves all options for management, ranging from termination of pregnancy to active interventions to prolong neonatal life. This care planning often involves treatment of or minimization of potentially painful or harmful procedures. Unfortunately, due to limits in scientific understanding and the variation in individual values and priorities around pain, there is no universally accepted approach to preventing and managing perinatal pain.

Pain is not a simple concept. The formal definition of pain, according to the International Association for the Study of Pain, is "an unpleasant sensory and emotional experience associated with or resembling that associated with, actual or potential tissue damage."[4] In other words, pain is a complex interplay of subjective psychological, emotional, sensory, physical, and learnt experiences that permit recognition of a stimulus. It is the variable interaction of these components that make it difficult to determine the presence or absence of fetal pain.[5] Furthermore, the topic has been drawn into the political arena, where the hypothesized presence of fetal pain has been used to curtail patient autonomy in the form of abortion restrictions.[6,7] These abortion restrictions that include gestational age bans and other barriers further complicate difficult decisions and can cause patients to feel rushed in making life-altering decisions.[8] This environment is further complicated by the changing obstetric and neonatal landscapes, that in some centers allow for and even advocate for active resuscitation of neonates born at extremely preterm gestational ages that historically would have been deemed previable (i.e., less than 23 weeks).[9] So, it is with this multilayered, cloudy lens that we will review the expert opinions regarding the fetal capacity for pain and management considerations when providing perinatal palliative care. We will use specific hypothetical examples of families that may benefit from perinatal palliative care, with a focus specifically on the minimization of pain.

> *Patient A is currently pregnant for the second time. She was late to prenatal care, so only recently had her first ultrasound. This ultrasound showed that she was approximately 20 weeks, and the fetus was diagnosed with anencephaly. She was counselled regarding her options and the life-limiting severity of this diagnosis. After discussing with her family and physicians, she has decided on termination of pregnancy, but inquires about fetal pain with dilation and evacuation.*

First, there is no way to definitively know when and if the human fetus experiences pain. Our current understanding of pain perception is that it requires communication between the peripheral sensory neurons, spinal cord, thalamus, and cerebral cortex. Human fetal studies that have evaluated the development of connections between the thalamus and areas of the cortex suggest that most do not begin forming until around 24 weeks gestation, and in fact, some have observed even later development (28-30 weeks gestation). It is therefore hypothesized that a fetus could theoretically experience pain beginning sometime between 24-30 weeks. However, these observations are based on the development of neural pathways for vision and the perception of sound and are not specific to transmission of painful stimuli. Alternative theories have proposed that thalamocortical connections may begin to develop earlier (around 20 weeks gestational age), based on the observation of a subplate carrying various afferent connections that will eventually migrate to and become the cortex.[5] However, no human studies exist that are specific to thalamocortical connections and fetal pain.

Critics of existing literature cite the limitations of using neuroanatomical development as a marker of the capacity for pain, and propose indirect measures of pain such as heart rate, withdrawal movements, or changes in facial expressions to help guide assessment.[10] Others recommend using proxies for pain based on data in anesthetized adult and pediatric patients.[11] However, developmentally it is important to recognize that these proxies are unable to be applied reliably or at all to a fetus. There are other pathways that exist which create reflex movements to a stimulus, as in the example of touching a hot stove and reflexively pulling away prior to even "feeling" the heat. Pain can also be perceived without a physical stimulus, as in the example of a person with an amputation, experiencing pain in a limb that is no longer present. Additionally, markers like elevated heart rate are known to occur in utero with non-painful stimuli like vibroacoustic stimulation or fetal scalp massage, as well as more invasive stimulation like fetal scalp puncture and Allis clamp stimulation.[12] Therefore, indirect measures of fetal pain are likely less accurate than neuroanatomical estimates.

Based on this understanding of fetal development, experts, including the American College of Obstetrician and Gynecologists, The Royal College of Obstetricians and Gynecologists, and the Society for Maternal Fetal Medicine, all conclude that the human fetus does not have the developmental capacity for pain until after 24-25 weeks gestational age.[13] Furthermore, the physical presence of these pathways cannot determine the perception of pain, because the experience of pain is a complex interplay between the physical capacity for perception and the cortical processing of that sensation.

For pregnancy termination procedures, the administration of additional anesthesia beyond what is required for successful completion of the procedure is not recommended.[13] This is for several reasons. First, there is no evidence supporting benefit to the fetus. Second, most procedures after 24 weeks are performed with sedation or general anesthesia, which does have transplacental passage and fetal effects. Lastly, there is the potential for maternal harm with administration of additional analgesics.

There may be situations at later gestational ages or with other clinical interventions where fetal analgesia may be considered. For example, during procedures like intrauterine transfusions, experts advocate for the use of intrauterine paralytic agents for the purpose of decreasing fetal movement and minimizing additional complications that may arise from such movement. Additionally, during open fetal surgery, there are reports where elevations in catecholamines and cortisol resulted in fetal bradycardia, uterine contractions, and preterm labor. Therefore, for those procedures that do not require maternal general anesthesia, administration of opioids and paralytic agents are typically recommended to minimize the risk of these complications.[13]

In utero, these recommendations help to create a harmonious care plan that minimizes harm to the pregnant person, especially in cases where the fetus is less than 24-25w. At more advanced gestational ages and after delivery, management considerations can account for parental goals and to minimize even the perception of neonatal pain.

> *Patient B is currently pregnant with her 7th child. She is accompanied by her partner during her ultrasound at 18 weeks, which demonstrated several anomalies of the fetal brain, heart, extremities, and genitourinary system. After comprehensive counseling, she decided to continue her pregnancy with the goal of minimizing harm for herself and her baby. She continued to have ultrasounds, which demonstrated that the combination of these anomalies was severely life-limiting. During her pregnancy, she had the opportunity to meet with the perinatal palliative care team, who worked with neonatology, pediatric subspecialists, and her obstetrics team to outline her family's goals and plans before, during, and after the delivery. She delivered in the hospital after an unmonitored labor. Her baby was born alive and was immediately handed to her and her husband. The neonatal team was present to confirm the prenatally detected anomalies. The pediatric palliative care team was present, and morphine was administered one time during the infant's life. The parents were able to spend several hours with him prior to his passing.*

The key components of a perinatal palliative care plan are support of the patient and family during this challenging journey. Communication regarding goals, cultural beliefs, values, and options for management are essential in the creation of a productive partnership. Goals can include assessment after delivery for confirmation of life-limiting anomalies, plan for life-prolonging interventions, or provision of comfort care. Several meetings are often required to review options, delivery planning, and postpartum/post-delivery care. Plans for optimizing the quality of life for a newborn after delivery can include minimizing invasive procedures, provision of skin-to-skin care, swaddling, and pharmacologic methods of pain management (i.e., opioids, benzodiazepines, etc.).[14, 15]

In our experience as obstetric, family planning, and pediatric physicians, neonates born alive at previable gestational ages or who are born with life-limiting anomalies that involve the absence of cortical development (i.e., anencephaly) will sometimes exhibit reflex responses, including movement in response to touch. These movements can be distressing to parents and health care staff as this can appear to be a pain response. It is important to recognize that this is a nociceptive response (not requiring cortical brain activity) and not evidence of sensation of pain, but still can be disconcerting to observers. As an example, in 2021 Berry published an article exploring the parental experiences of families who elected for perinatal palliative care for their newborns diagnosed with

anencephaly.[16] One of the major themes of this qualitative study was the concern for managing pain and facilitating a "good" death. Therefore, in this instance, despite the complete absence of a cerebral cortex, parental concern for fetal pain may be sufficient to warrant neonatal treatment. In these specific cases of balancing management of parental anxiety against an unnecessary neonatal intervention, the authors believe it is reasonable to administer interventions to mitigate the perception of pain.

> *Patient C is currently pregnant for the second time. Their last pregnancy was complicated by preterm labor at 20 weeks. They are currently 22 weeks based on dating from their IVF transfer. On arrival to labor and delivery they are fully dilated. A live infant is born minutes later.*

This unfortunate obstetric scenario is uncommon but devastating for families. Although discussion of the controversies regarding perinatal resuscitation at the limits of viability is beyond the scope of this paper, we chose to include this in a discussion of pain to highlight the possible emergency situations that don't allow for prenatal planning and produce varying opportunities for integration of perinatal palliative care. Within the United States, there is wide heterogeneity in hospital practices regarding neonatal resuscitation <23 weeks gestation and even greater variation in outcomes at this extremely preterm gestational age.[17, 18] For those families that proceed with comfort care in the setting of periviable delivery, or if there is an intrapartum or intrauterine fetal demise, postpartum support for the grieving family is essential. Even if the fetus is a candidate for and survives the initial resuscitation, the postdelivery period is associated with significant physical, emotional, and spiritual pain that permeates every aspect of the family's lives. We would be remiss in our review of perinatal palliative care and pain if we did not comment on the essential need for and current lack of support services for parents experiencing all forms of perinatal loss (including termination of pregnancy).[19, 20]

Perinatal palliative care is an essential component of the management of pregnancies complicated by life-limiting anomalies or complications. By providing a comprehensive approach to antepartum, intrapartum, and postpartum/postdelivery care, perinatal palliative care allows for the implementation of interventions to mitigate suffering and honor parental goals. Based on the best available evidence, it is unlikely that the fetus has the neurodevelopmental capacity to experience pain prior to 24-25 weeks, and so prior to this gestational age, management should focus on minimizing maternal harm. In cases of life-limiting fetal anomalies, periviable live birth, and many other clinical scenarios, there is minimal risk to providing interventions for pain after delivery, and it is reasonable to administer interventions if desired by parents to mitigate the family's total pain.

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Integrating Psychology Into the Treatment of Pediatric Pain and Related Symptoms

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Pain in pediatrics has historically been under-recognized and under-treated. In pedatrics, suboptimal pain control can lead to a host of problems, many of which interfere with the patient accessing future medical care. One of those problems is pediatric chronic pain. As common as asthma and ADHD among youth,[8] pediatric chronic pain can persist into adulthood without effective treatment.

In the last thirty to forty years, pain scientists and specialists have been working to improve access to effective pain care. Many of these researchers and clinicians who have led these efforts are psychologists. Because of their work, the benefits of applying psychology tools in the treatment of pain and related somatic symptoms is recognized in pain treatment centers.[3] And yet, this knowledge can be difficult to translate to the actual patients that seek care. Children and families can feel ignored or dismissed by their healthcare provider when they are referred to a psychologist or psychotherapist for treatment of a physical problem like pain. In the pediatric pain clinic where I serve, we frequently hear patients say that they think their provider is telling them that they are "faking it" or "it's all in their head." Several factors possibly contribute to this breakdown in communication: the biomedical focus of the western healthcare system; medical visits that are too short to allow for proper collaboration and provision of clear education; lack of funding allocated to integrating psychological and mental health care into medical settings; and lack of education and training of both medical and psychological providers in pain management.[6] These factors support the need for integrating pediatric psychologists into both primary and specialty medical teams.

As a pediatric psychologist in an integrated treatment clinic, all of the interventions I provide are through a unified team approach involving physicians, nurses, physical therapists, and integrative medicine specialists. As part of this team, the most important intervention we offer is explaing how pain works. Pain education or Neuroscience Education is an intervention that explains "the neurobiology and neurophysiology of pain and pain processing in the nervous system."[9] There are seven target concepts identified in the literature: "1) There are many potential contributors to anyone's pain; 2) We are all bioplastic; 3) Pain is not an accurate marker of tissue state; 4) Pain education is treatment; 5) Pain is a brain output; 6) Pain is a protector; 7) Pain can become overprotective/ sensitized."[5] In teaching these concepts, providers try to instill hope that ongoing pain does not mean that the pain is permanent. When families are able to conceptualize pain in this way, research suggests that it can produce immediate and long term improvement in pain severity, physical activity, fear, and catastrophic thinking about ongoing harm to the body.[9] As a team we all communicate to families that we believe their child's pain is real physical pain, and as a team we all also describe how psychological tools modulate the brain's production of pain signals.

In practice, features of this initial education often includes use of metaphor, imagery, and diagrams to explain the role of psychological skills in treatment. Because psychological treatment of pain and related symptoms requires patients to take an active role in their care, if patients and families don't connect with the education provided, the treatment will not progress.

One popular education technique, the use of metaphor, helps to make the complex process of pain more concrete and clear.[2] The most common metaphors paint a picture of a broken messaging system between the brain and the body. Providers may describe faulty technology like a broken fire alarm or car alarm, a glitchy computer, a telephone with bad reception, or even a broken record player. These metaphors illustrate how the nervous system, which carries sensory messages into and out of the brain, can malfunction, go "haywire," "breakdown" or "misfire." When this messaging sytem breaks down, then the brain can overproduce sensations like pain, even when the body is not being harmed. With advances in video technology, there are also some strong pain education videos that demonstrate these metaphors in action. I often send these videos to families, so they may review the content at home.[5]

While using metaphors to illustrate the process of pain, another way I incorporate illustration is by drawing the model of modified Cognitive Behavioral Therapy (CBT) [see Figure 1]. Psychologists use a combination of cognitive, behavioral, and biobehavioral strategies (e.g., biofeedback) in the treatment of chronic pain. While there is not yet conclusive evidence on which components are most effective for which populations, most interventions can be categorized into one or more of the domains within this modified CBT framework.[3, 4, 10, 11] According to this model, I use the diagram[see Figure 1] to describe a common feedback loop: 1) patient experiences a distressing symptom (Body); --> 2) the common default response to this symptom is to rest and avoid activities (Behavior); --> 3) this leads to fears and worries about the symptom persisting or worsening (Cognitions); --> 4) which triggers more stress and anxiety (Feelings); --> 5) which raises the volume or intensity of the symptom (Body); --> 6) which leads to more avoidance and withdrawl from life activities (Behavior), and so on, until the person is really stuck in this cycle. In order to break this cycle, changes needed to be made across each of the components represented by the diagram.

To further illustrate the practice of this CBT approach, I draw each CBT domain as a box and then pause to elicit ideas from the child or teen on the skills or strategies that they think could fill those boxes [see Figure 2]. By deliberately mapping out the types of interventions and tools within each box or "tool-box" I can further assess what the child already knows how to do and empower them to increase use of those strategies. It also helps to identify areas that would benefit from more direct teaching and practice. From here, I like to strengthen our therapeutic alliance by asking the child to guide which box will be our starting point for learning and practicing skills. Asking the child to identify where we start also models to caregivers the importance of showing confidence in their child and in supporting their autonomy. Over the course of treatment, these CBT diagrams may also serve as helpful references for familes when trying to trouble-shoot what to do when pain flares and inteferes with valued activities.

When I am able to move into the skill-building phase with a patient, the use of imagery continues to be an important medium. Skills and interventions like guided imagery, self-hypnosis, body-mapping, and art therapy techniques each tap into the use of visual exploration as a means of modulating one's physical experience.[7] Clinical hypnosis, one of the keystones of mind-body approaches in integrative medicine, captizalizes on a child's ability to use their imagination to create vivid, visual experiences, which can support healthy dissociation away from distressing sensations like pain.[7,1] One way to modulate pain through imagery is by using a child's initial drawing of their pain and then asking them to imagine changing their picture, for example, by shrinking it or changing the colors. Younger children in particular are still developing language, so it can be more useful to explore their experience through images instead of words. This means that the cognitive strategies that are such a hallmark of CBT need to be adapted as well. Incorporating pictures, images, drawings, and sparking the child's imagination, can all be helpful alternatives to talking or examining conscious thoughts.

Most of this education and guidance described is done with caregivers and children together, and often I will meet with caregivers separately for coaching. Even if it may not feel like it to caregivers, their influence on their child is exponentially greater than mine. I only see their child one hour per week at a time (if we are lucky), but caregivers are with their child nearly twenty-four hours of every day. Caregivers are a signfiicant part of the treatment team. To that end, I often supply additional reading, tip sheets and handouts just for caregivers. One of the books that I have found to be most accessilbe for caregivers in making sense of this approach is the book Conquering Your Child's Chronic Pain by Zeltzer and Schlank.[12] This book addresses pain across the spectrum of pain and illness, and pays good attention to the interplay of mental health. The majority of caregivers with whom I have worked have appreciated its content and have resonated with its message. This book also helps caregivers to be more proactive in identifying ways that they can start making changes that align with their family values and dynamics.

Finally, depending on the needs of the child, most psychologists serve as a liaison with schools. As children and caregivers try to understand persistent pain and its treatment, schools may struggle to support the child appropriately. School systems can be either too dismissive of the challenges the child faces, or they can reinforce the avoidance feedback loop and disempower the child in managing their condition. Extending pain education and guidance beyond the child and family to their school is often needed. I provide school presentations; collaborate with on-site counselors and mental health professionals; write letters for accommodations protected under Section 504 of the Rehabilitation Act of 1973; and advocate for Individual Education Plans (IEPs) protected under the Individuals with Disabilities Education Act (IDEA). I may also attend school meetings to advocate for appropriate support.

The central theme here is that the treatment of somatic problems like pediatric chronic pain is a team effort that starts with clear pain education and alignment between the multidisciplinary team and family. The bulk of integrated pain care really is developing an alliance with familes for the multidisciplinary treatment approach, and securing trust that psychology is an essential element of this team approach to treating a physical problem like pain. Once kids and families are committed, our treatment can focus on teaching and refining the skills and strategies that will help them to feel better and to move forward.

Figure 1: Modified CBT Framework

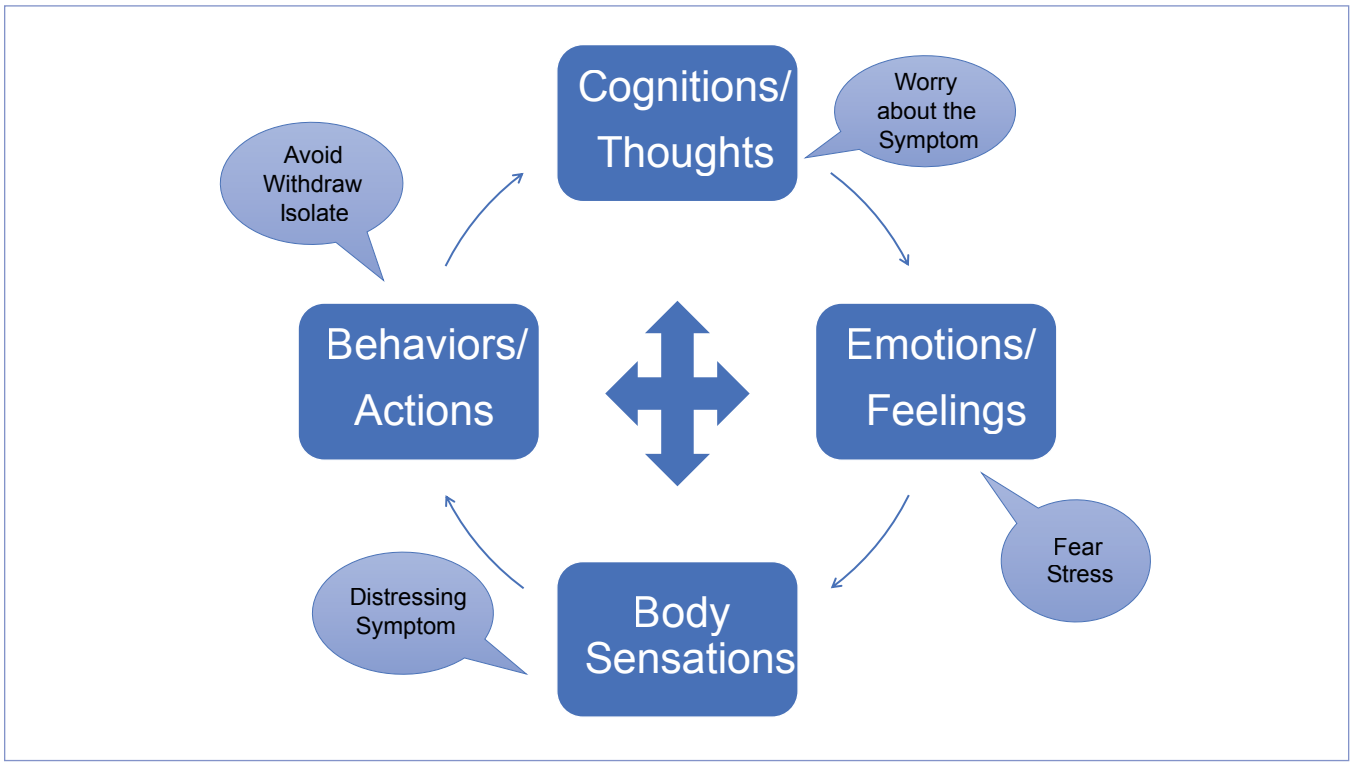
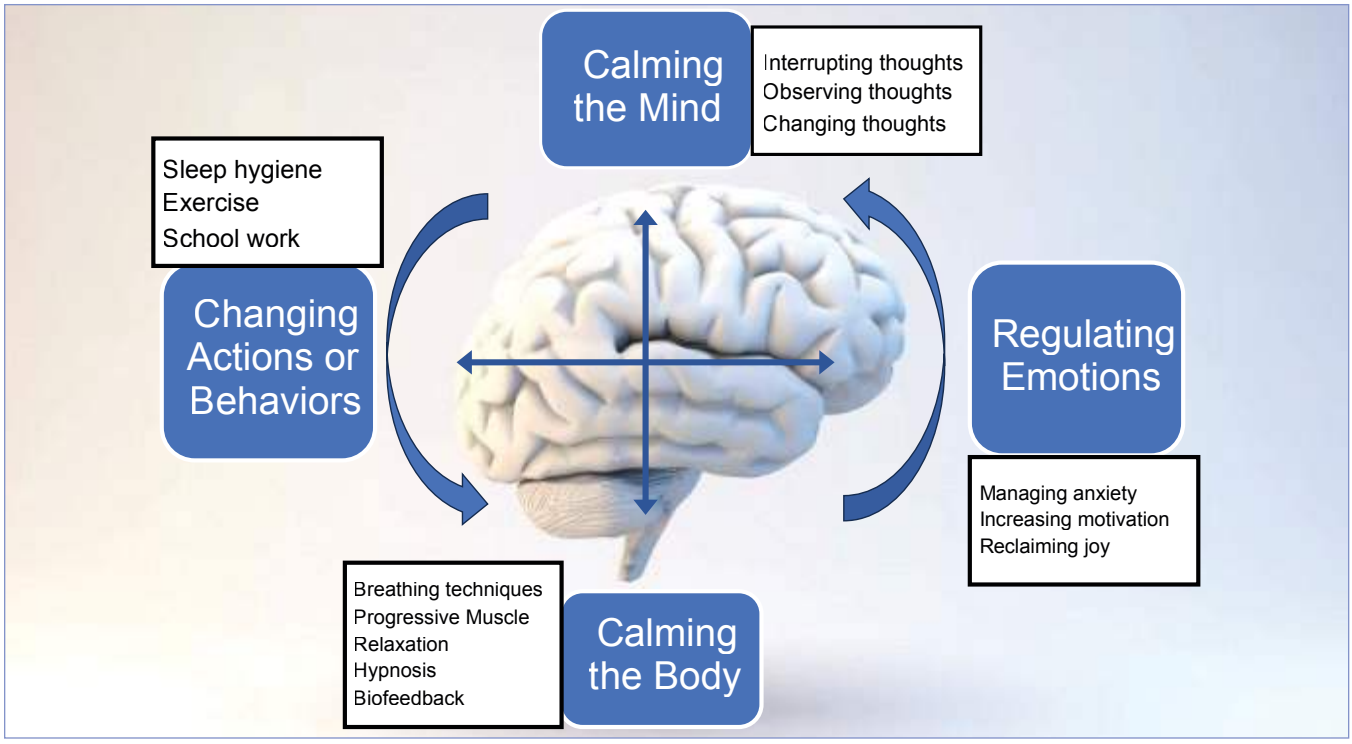


Figure 2: Coping "Tool-Boxes



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Reiki Therapy in Managing Total Pain at the End of Life

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It is estimated that 25 million people in the world die in pain each year (Mehta & Chan, 2008). One systematic review reported that 84% of cancer patients will experience severe pain, 49% will have shortness of breath, and 33% will report nausea (Pan, Morrison, Ness, Fuggh-Berman, & Leipzig, 2000). Approximately 85% to 92% will have their pain controlled by pharmacological and non-pharmacological methods (Mehta & Chan, 2008). However, even with all of the advancements in pain and symptom management, a significant number of people continue to have pain and dis-ease at the end of life (Byock, 1997). Dis-ease is usually defined as not feeling at ease within oneself or a lack of well-being (Groves, 2007). Pain, anxiety, nausea, and other symptoms that occur at the end of life are a major focus for providers, organizations, advocacy groups, and clinical staff in hospice and palliative care (Lewis, Vedia, Rueer, Schwan, & Tourin, 2003).

Pain is officially defined as an "unpleasant sensory and emotional experience with actual or potential tissue damage" (Mehta & Chan, 2008). We also know that pain is very subjective and is what the patient reports. However, pain goes beyond just physical pain—it also includes psychological, social, and spiritual components, and is greatly influenced by past experiences and cultural dimensions (Abraham, Kuntner, & Beaty, 2006; Mehta & Chan 2008). It is important to assess for other losses that may be contributing to the pain or dis-ease, such as loss of job, career, mobility, hope, independence, depression, and guilt (Abraham, Kuntner, & Beaty, 2006).

Dame Cicely Saunders, nurse, social worker, then physician, was one of the founders of the modern hospice movement in 1967. Dr. Saunders took assessing pain to another level by asking this simple question of her patients: "How are you within yourself?" (Groves & Klauser, 2005). She was very aware that pain went beyond physical pain, and developed the Total Pain Model. This model includes physical pain (due to disease location, nausea, fatigue), but also psychological pain (feelings of grief, depression, anxiety, anger, and adjusting to the impact of the disease and dying), social pain (relationships with family or friends or pets, role in the family, work life, financial concerns), and spiritual pain (faith, religion, existential issues, meaning of life and the illness, and personal values) (Groves, 2007; Mehta & Chan, 2008). She also believed that all of these elements were interlaced and influenced by each other.

Managing pain and dis-ease at the end of life often is complex and requires the whole care team to coordinate the plan of care. Since 1990, there has been an increased acceptance in the use of complementary or integrative therapies for the relief of pain and symptom management. From 1990 to 1997, the National Center for Complementary Medicine (CAM) reported that there has been a 47% increase in visits and a 45% increase in expenditure for complementary and alternative medicine (Lewis, Vedia, Rueer, Schwan, & Tourin, 2003). Energy work and spiritual rituals have been used for healing around the world for thousands of years in many ancient cultures.

The word "Reiki" is defined as Rei meaning "universal" and Ki meaning "energy" (Lewis, Vedia, Rueer, Schwan, & Tourin, 2003). Initially, Reiki was passed on orally from Master to student, as it was thought that Reiki symbols and text should not be written down. Over time, the techniques of various styles of Reiki became more mainstream and taught worldwide. When performing Reiki, the practitioners' hands do not necessarily make physical contact with

the patient, but hover over them. Reiki may also be performed without the patient physically in the same space as the practitioner, which is known as distant healing.

There continues to be some controversy on how Biofield energy therapies, such as Reiki, work. To see how Reiki is able to heal, one can obtain some answers in Einstein's theory of E=mc2. According to Steinhardt (2013), we are energy beings and there is energy in every living thing. Reiki is about using that pure mindfulness energy, devoid of the ego or our own belief systems. Reiki instantly connects the healer to the source of all energy (Steinhardt, 2013). It is also known that disease or dis-ease occurs when there is an imbalance of our energy centers (Chakras). When this energy is free flowing or in balance, one is more likely to be able to maintain wellness, and the body has a greater ability to heal itself (Dailey, 2005; Rand, 2011, 2013a, 2013b. 2015; Steinhardt, 2013). What is unique about Reiki compared to other Biofield energy work is that the Reiki practitioner does not need to know what is going on with the patient, as the energy goes where it is needed (Rand, 2011, 2013b, 2015). Also, in Reiki, unlike other similar therapies, the practitioner cannot take on the "ill energy of the patient." Instead, practitioners will state that they get just as much benefit when performing Reiki as the patients do. In one study, the patients and the practitioner had EEGs prior to and directly following the Reiki sessions. Results showed that both the patient and the practitioner had alpha or alpha-theta brain waves that induce relaxation (Dailey, 2005).

Last to note is that the practice of Reiki, similar to other Biofield therapies has stirred concerns about the possible correlation with religion and faith. The energy that is utilized in this and other therapies is related to the source of life itself and is far older than any religious dogma.

In reviewing the literature for comparative studies, So, Jiang, and Qin (2008) looked at 49 articles using RCT to study touch therapies for pain and anxiety relief in adults. The Center for Reiki Research (2012) also reviewed these articles. The review showed that Reiki may be effective in relieving pain and anxiety. The reviewers also pointed out that the studies had common limitations, and recommended further studies using a larger number of patients, setting designated treatment guidelines and randomized grouping.

Potter (2013) conducted a review of Reiki research over an 11-year period (2001-2012). He reported that many of the studies had limitations such as no designated control group or placebo (sham practitioner), and small sample sizes. In doing his analysis, he found that studies of 10-49 Reiki sessions provide limited reliability, and only those with over 999 sessions with approximately 4.1 sessions for each patient, provide good statistical reliability. Potter (2008) also noted that about 8% felt worse after the first session for an average of three days. This was not noted in future sessions. In his review, stress and pain were noted to be the main reasons for people to seek Reiki therapy, with 97.5% of the patients reporting to be relaxed after the session. Patients also reported feeling more in balance (78.6%), reduced discomfort (66.7%), reduced emotional upset (66.7%), less pain (36.63%), and less stress (57.1%).

In a systematic review, 66 studies were examined involving Biofield therapies. All met the criteria of being an RCT, peer reviewed, therapy provided in the same room as the patient (no distant healing), quantitative components, with pre and post measures, and a control group. Ten of the studies were specifically on the use of Reiki. Each Reiki session was 3 to 90 minutes long, and each patient received an average of four sessions. The results show strong evidence for reducing pain intensity among those experiencing pain, and moderate relief in those who are hospitalized or have a diagnosis of cancer. The same review showed a moderate relief for decreasing anxiety with a very strong effect on improving fatigue and quality of life on cancer patients. Again, the sample size was a limitation; more biomarkers are needed in order to see if there was another explanation for the results (Jain & Mills, 2010).

One last review looked at three studies on Reiki involving 1,153 patients. The results showed a greater positive effect in alleviating pain from Reiki than Healing Touch (HT) or Therapeutic Touch (TT) (So, Jiang, & Qin, 2008).

Even though we do not completely understand how Reiki works, there have been several studies noted above that have shown to benefit patients by promoting relaxation, providing peace of mind, decreasing pain and anxiety, and increasing the immune system (Miller, 2006). Other benefits found in the literature that patients experienced were less fatigue, increased appetite, decreased depression, increased hope, improved sleep, and clearer thinking (Bonney, 2006; Drozdoff, 2011; Greenfield, 2013; Heiman, 2006; Lipinski, 2006; Miller, 2006; Morgan, 2021; Rand, 2011; Silva-Johnson, 2013; Stellato, 2013, winter; Stellato, 2013, spring).

The management of discomfort at the end of life continues to be a primary goal for hospice and palliative care. Introducing integrative approaches to be used in conjunction with traditional modalities is not new but requires careful planning to ensure its success. Reiki can be an integral part of the plan of care to provide additional relief of pain and anxiety at the end of life. Further study with a larger number of patients, with a control group, and closer tracking of medications for symptom management would need to be done to validate reliability of results achieved so far. In addition, a recommendation of further analysis of data by sex, age, ethnic group, any biomarkers (Vital Signs, O2 Saturation, etc.) or the diagnosis might strengthen the data results. It is desired to expand the use of Reiki Therapy with patients in all levels of care, including the pediatric population.

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Pediatric Palliative Aquatic Therapy

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The Pediatric Palliative Aquatics program was pioneered by Sheila Pyatt, RN, over 15 years ago at the George Mark Children's House (GMCH), a free-standing pediatric palliative care center based in San Leandro, California. Sheila was inspired by her own WATSU and Jahara aquatic training. She adapted this warm water therapy for the patients at GMCH. Over the years this unique palliative aquatics program has gradually expanded and become a beloved adjunct to the child life services offered at GMCH. It is currently run by five on-call registered nurses who come 3-4 times a week to provide this alternative palliative care therapy. Pediatric Palliative Aquatics aims to follow the goals of palliative care by improving quality of life, promoting relaxation, and contributing to pain and symptom management.

The children at GMCH, all with life-limiting conditions, have multiple and complex diagnoses. A vast majority are wheelchair and bedbound, often with neurological impairment, significant contractures, and restrictive lung disease.

This warm water modality aids in providing improved circulation, improved respiratory function, decreased agitation and irritability, increased range of motion, and relief of spasticity, stiffness, and pain. The human connection and nurturing physical touch, in conjunction with the warm water experience, provide a feeling of emotional support, freedom, and joy. Bedside nurses have reported that following aquatic sessions patients will appear calmer, have increased range of motion, and have better quality rest and sleep. Families have reported that their child experiences a sense of freedom in the water, along with an improved sense of relaxation and calm. Some GMCH families have gone on to ask "Make A Wish" for a hot tub for their own home after witnessing the advantages of this warm water therapy.

Preparation for an aquatic session includes:

- Patient is assessed for suitability by bedside and aquatic nurses
- Physician and guardian consent is obtained
- Aquatic RN and second adult* are present for all sessions (*depending on complexity, the second adult may be a volunteer, parent, or a second RN)
- Pool environment is prepared (toys, music, and medical equipment as needed; oxygen, portable suction, Hoyer lift)
- Routine safety and equipment checks are performed

During a session the aquatic RN will complete an assessment of the child's overall well-being, paying attention to body, mind, and spirit to offer an individualized experience each session. Sessions may include music, gentle stretching, passive range of motion, massage, and effortless floating. Collaboration with child life and music therapy may be included. Sessions are creatively tailored to a child's needs and interests, for a peaceful or active session. With few exceptions (open wounds, infectious process, diarrhea, contraindication for full water immersion),

all children are eligible for a palliative aquatic session. Children with gastric tubes, VNS implants, and vesicostomy, or requiring supplemental oxygen, can all participate. With appropriate modifications and precautions, even children with tracheostomies can receive sessions.

Sessions last approximately 30-60 minutes in a 98° F pool. Most sessions' sweet spot is 45 minutes, which allows time for integration into this full sensory experience. Exceptions may include thermoregulation issues, seizure precautions, and other physical or emotional sensitivities, which would dictate a shorter session. Children who are over 15kg and immobile are lifted into the pool via a Hoyer to maintain patient and nurse safety. Others are lifted onto a mat for transfer.

While it can be difficult to discern or quantify benefits of aquatic therapy in a predominantly non-verbal patient population, these children appear to "lighten up." This weightless, warm water environment, unburdens joints and bodies, thereby allowing a sense of freedom and peace. This may be evidenced by a smile, a laugh, relaxed facial expression, deep breaths, or by (our gold standard) huge audible sighs. Interactive children enjoy the freedom of unrestricted movement and the normalization of childhood water play. For bedbound children, the experience of floating free of the strictures of gravity can be profound.

Interoceptive Somatic Strategies for Children at End of Life

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The nature of suffering is as individual as it is expansive. Suffering is not simply an illness experience. Terminal torment reaches relevant layers of all beings, including children. Interoception is a distinct discernment that offers young minds insights to govern their experiences at end of life. Interoception is the awareness of internal sensations in the body, including heart rate, respiration, hunger, fullness, temperature, and discomfort, as well as emotional sensations that frame the impact of profound illness. Interoception is a skill available to children of all ages. Installing individualized interoceptive somatic strategies allow children agency over uncontrollable disease, enhance the felt sense of well-being, and diminish anxiety and pain perceptions.

We understand suffering as multifocal requiring intention and attention to neutralize its impact. Compassionate inquiry is an avenue I found to address the very real spoken and unspoken fears of terminal torment. Because children have varying degrees of understanding and perceived agency over their lives, compassionate inquiry assists children in distinct discovery of distressing symptoms to provide pathways to swiftly soothe and ease tension in diseased bodies. Compassionate Inquiry directs the approach of care to the most significant symptom through non-medicinal evidenced-based integrative practices.

Young children naturally have less expanded vocabulary to express their internal landscapes and desires. Compassionate inquiry is the key to how hospice professionals advocate, manage, and ultimately inhibit suffering of terminally-ill children.

Suffering prevention requires thoughtful approaches to each experience, including a broad gathering of non-medicinal methodologies including the application of movement as medicine, poly-vagal theory integration, inner awareness meditations, and creative therapeutic expression to enhance the holistic framework that hospice provides. Implementing just a few integrative practices with primary caregivers can have considerable positive impact on a dying infant and preverbal toddlers.

I am fortunate to be in my 19th year of nursing practice in pediatric hospice care. As a Registered Nurse and advanced yoga educator/practitioner, I am uniquely positioned to unite western and eastern approaches that allow tangible options and input into the pediatric hospice plan of care. Compassionate Inquiry is a skill that observes verbal and nonverbal cues of a child to shine focus on verbal and nonverbal needs. The emotional voltage of end of life is known to diminish pain control, negatively impact relationships, and disrupt the internal sense of wellbeing in young bodies. With expert integration of alternative interventions for children, suffering at end of life can be greatly diminished, if not eliminated. When suffering of a dying child is aptly mitigated, the family trauma of loss can be eased, as well.

As I considered children I have provided interoceptive somatic strategies for over the years, I was compelled to share two cases. All identifying markers have been adapted to protect confidentiality. We will discuss each case and how non-traditional symptom management techniques enhanced lives by providing interoceptive somatic strategies as tools within the hospice plan of care. Both of the children discussed have died, yet the somatic strategies installed in the plan of care continue to be accessed as high coping tools for the families as they manage their intense evolving grief.

DIPG, Diffuse Intrinsic Pontaine Glioma, is a brain tumor with no curative treatment options. It is diagnosed usually between the ages of 6-10 and commonly causes death within 6 brief months after diagnosis. The DIPH disease trajectory is as swift as it is devastating.

A DIPG dramatically disrupts the daily routine of every child it touches. I explain to families how this dreaded diagnosis is like a tumor with tentacles invading the brain, evaporating everything from communication and mobility, to emotions. There is no area of a child's life that a DIPG doesn't steal. Anxiety becomes a steady presence with the daily devastating disease progression. Ongoing meetings with physicians, lack of control of treatments, and developmental unawareness lead to justifiable feelings of insecurity and fear in this affected age group.

Brandon, an only child, was 6 years old when he was diagnosed with a DIPG. He adored learning, playing soccer with his friends, and being outside as long as the sun hung in our southern sky. His friends and family described Brandon as a child with a kind and strong heart, as he had the gift of thoughtfully encouraging his team mates and friends any chance he got. One night after a soccer tournament, Brandon woke his mother shaking violently in the family bed. His mother observed Brandon having large jerky whole body movements and instantly called 911.

Upon a thorough evaluation by the Emergency Department, an MRI showed a mass promptly diagnosed as a DIPG. Brandon's family was impacted by life-altering traumatic grief in that moment. The instant awareness of Brandon's fate of a shortened life continues to haunt his family present day. (Note: In pediatric hospice we honor that grief begins and is supported at diagnosis throughout bereavement. The use of the term anticipatory grief has been described by families as belittling to the grief of parents caring for terminally ill children.)

Upon my initial consult with Brandon's family for pediatric hospice, I felt deep anxiety radiating from Brandon's parents. I remember sitting across from Brandon's mom as we began to discuss details of her family's desires as we planned next steps. She held her arms closely folded together over her belly and gently rocked back and forth in her chair. I recognized that Brandon's mom was unconsciously connecting to interoceptive somatic strategies as we began discussions of building the path that would best support Brandon's life until his death. Rocking is primal and soothing to a body experiencing fear. Rocking is an interoceptive somatic strategy to mitigate traumatic grief and unseen suffering without saying a word. Compassionate Inquiry doesn't require words, yet, requires proficient listening skills.

Once at home from the hospital, Brandon became tearful at night and deeply retreated from his life once full of fun school age activities. His loss of normalcy caused frustration that leaked into every aspect of his life, including his sleep quality. His insomnia was resistant to medicinal approaches. He lacked restorative rest. Anger, a secondary emotion, became Brandon's leading emotional expression. He reported to our team that his tumor controlled his life and made him lose all of his friends and his fun. Brandon's anger landed hard on his grief-stricken parents leaving them at a loss for how to help.

In conversations with our chaplain, Brandon discussed fears of discussing his tumor with his parents because it made his parents cry. Brandon's parents had fears of their own about discussing the tumor with Brandon, as they didn't want to scare him with the unfortunate outcome expectation. The family was shouldering significant emotional and spiritual suffering with little hope for resolution. Brandon was reflecting his anxiety through his body. Lack of restorative sleep, anger, suppression of emotions, and fear of upsetting his parents combined to create relentless pressure for a 6 year old nearing end of life. Compassionate inquiry allowed us to gently address the constant flow of anxious thoughts that diminished Brandon's life quality and became the interdisciplinary focal point of care. Even though children on hospice have limited life expectancy, our team ensures that we do not limit their life or the interventions we implement.

We found commonly prescribed benzodiazepines effectively sedated Brandon. Yet, the impact of medication on his opioid naive body, and the forgetfulness with the fatigue hangover benzodiazepines caused him, ultimately elevated his anxiety. He would refuse the pills offered to soothe his internal uneasiness. Fear and ruminating thoughts were the symptoms that significantly diminished Brandon's life quality. We needed a unique non-medicinal approach to mitigate this understandable source of suffering. Interoceptive somatic strategies allowed

us to listen to his 6 year old needs, install a choice point for him, and ensure his desires remained the priority. Brandon detested taking his anxiety medications. Yet, anxiety was his leading distressing symptom.

Literature on resiliency teaches that trauma occurs when we don't have a choice. Brandon did not have a choice of his diagnosis and how it evaporated his full life of football and friends. Our Interdisciplinary global goals included allowing Brandon as many effective options as possible to navigate the unimaginable. We honored his desire not to use medications. Yet, we allowed him to decide if and when medications would be used if appropriate. Our therapeutic goal was to offer a 6 year old avenues and agency to mitigate the emotional voltage of a terminal trajectory.

After discussing and receiving consent to apply interoceptive somatic strategies with Brandon's parents, I explained a Head to Heart meditation to Brandon. I demonstrated the 3-5 minute meditation and described how this simple exercise would allow him to capture all of his scary and sad thoughts, gently swipe these thoughts from his mind, and allow the glow of his beautiful heart to melt these thoughts away and expand calm and ease to his body and environment around him.

Brandon responded to the meditation with focused listening and less restlessness. Even at 6 years old, his countenance changed when offered a self-directed meditation to manage his appropriate anxieties and perplexing feelings. Developmentally, school-aged children are not equipped with word banks to express entangled emotions. The head to heart meditation allowed Brandon to capture, compassionately contain, and expand his thoughts in moments of his life that otherwise would have been riddled by relentless angst. More importantly, we used interoceptive somatic strategies to allow Brandon to diminish thoughts that negatively impacted his life, without him having to word find or worry how his thoughts would make others feel.

The Head to Heart Meditation recognized Brandon's courageous heart as a glowing compassionate light of power to diminish fears and frustrations from his mind. I instructed Brandon (and his parents) in the meditation that effortlessly became a nighttime ritual and when flutters bubbled up in Brandon's belly. Below are the steps that Brandon and his parents found helpful in managing Brandon and parental anxieties. The interoceptive somatic strategy given to Brandon was of great value to his life quality.

Head to Heart Meditation:

- Find a comfortable seated position of ease.
- Gently close the eyes, bringing awareness of the physical sensations of courage and wellbeing located in the heart center.
- Allow a natural rate and rhythm of breath to unfold while noticing the rhythmic effortless expansion of the chest.
- Bring the hands to the ears, palms facing forward, with thumbs placed on top of each ear.
- Slowly allow the palms to join at the forehead in prayer pose, keeping thumbs as close to the head without touching the skin.
- Imagine intentionally scooping up unpleasant thoughts from the mind, clearing the mind of anxious thoughts and replacing them with sensations of safety and security.
  - When all of the thoughts are captured, allow the joined palms to fall to the heart center.
  - Release all worries to dissolve in the eternal warmth of the heart.
  - Allow the lungs to fill with air, bringing awareness how the rhythm of breath eases the body.
  - Repeat the meditation until all anxious thoughts are dissolved.

Brandon died 6 months to the day after his diagnosis of DIPG. Brandon's anxiety was managed effectively through his use of interoceptive somatic strategies. Research shows that anxiety at EOL can complicate effective management of other symptoms. As a result of Brandon's effective interoceptive somatic strategies for his anxiety, he experienced very little discomfort at end of life. His parents described his death as a death of honor and love. Brandon was in control. We gave him options. He was given agency to use medications when he felt they were necessary. Yet, he used Ativan only once in 4 months before his death. He reinforced the importance of allowing children to have input in their EOL care.

Our team continues to follow families for two years after the death of a child. It warms my heart to know that Brandon's family continues to use head to heart meditation as an interoceptive somatic strategy to manage their life-altering grief as they grow in the light of Brandon's legacy.

Ashley was 18 years old when we met. I recognize that I am the last person families wish to meet. I am thoughtful of the way our team meets to open dialogue at a hospice consult. Ashely was stoic when we were introduced. I remember her turning her body to face the window, as if to attempt to ignore all that was dismantling her life. Prior to a devastating diagnosis of aggressive rhabdomyosarcoma, Ashely had a life full of purpose and promise. She was a high school cheerleader set with a full scholarship to her mother's college alma mater when pain in her left thigh began to awaken her at night. She dismissed the pain, as it was football season, and her cheerleading practice was commonly brutal on her body. OTC pain meds and heating pads were routinely positioned in her bedside table to manage her brief injuries. Yet, this pain was different.

She maintained the thoughts that she deeply pulled a muscle or tore a ligament with the acrobatics of cheerleading. After an emergency department assessment, tests, X-rays, and needle biopsies revealed Ashely had aggressive rhabdomyosarcoma which, despite attempts, was resistant to disease-directed therapies.

Ashely's internal suffering was raw, deep, and rage filled, all naturally expected. Her physical pain was managed expertly with an opioid regimen. Yet, her internal suffering, as life approached its end, became acid to the once vibrant Ashely and her family.

Compassionate inquiry showed that it was not physical pain that was the source of Ashely's suffering. Her internal rage and despair set the stage to diminish the quality of her life that remained. Movement was a source of comfort to Ashely for many years, yet aggressive rhabdomyosarcoma evaporated much of the opportunities she once had to move her body with grace, ease, and expertise.

In efforts to contain her disease, Ashely's right leg was amputated due to profound metastatic progression. Movement became an unwelcome, exhausting, and frustrating chore. After discussing interoceptive somatic strategies and the evidenced-based benefits to her parents, we offered in-bed movement sequences to Ashely. The movement sequence offered aligned with ancient eastern approaches to move grief and sorrow through the tissues. With the thoughts of her death ruminating in her mind, Ashely decided to embark on a letter writing project to the people in her life that she held closest to her heart. Recognizing her impending death, Ashely swiftly took hold of her movement as medicine and letter writing to enhance every moment she had left with those she loved the most.

The posture introduced to Ashely is one that was accessible in the comfort of her own bed. It is my favorite asana of all of yoga. It is called "broken wing." The shape is known in traditional eastern medicine to soften the impact of grief and sorrow in the body. Eastern medicine teaches us that every organ system aligns with a distinct emotion, the lungs representing grief. Ashely yearned for a way to metabolize her grief, along with the rage, jealously, and despair, that often accompanies the cascade of emotions around loss. The lung meridian is located along the midline of the body, above the diaphragm, expanding to both sides of the body. Opening this meridian through postures offers expansion of emotions for metabolization and movement. Below are directions to access the shape of broken wing. It is a shape beneficial to anybody that is impacted by grief and benefitted Ashely up until the day before she died.

Broken Wing

- Lie on your belly on your bed. Keep your pillows close for support.
- Place both hands under your shoulders with both elbows bent.
- Stretch the left hand directly out from the left shoulder.
- Form a 90 degree angle from the left hand, to shoulder, down the left side body.
- Keeping your left palm flat, roll over onto the left side of the body.
- Keep your legs straight if you can. If not bend both knees for comfort.

- Focus on the stretch and deep opening of the left shoulder.
- Use pillows to support your head for comfort if needed.
- Sink into the softness of the bed and the sensations of expansion thru the chest.
- Breathe at your own rate and rhythm until you feel the urge to release the shape.
- Return to your belly, hands under both shoulders, elbows bent.
- Repeat the shape on the right side, holding the shape as long as it benefits the body.
- Repeat the sequence as often as you feel its benefits.

Ashely reported her grief as unfair, complex, and jagged. One simple modality was not going to provide her with the tranquility her heart so desperately craved. As her disease progressed, she became more and more confined to her bed. It was a sad reality. Yet, her personality of finding focus in her life enabled her to eventually embrace her bed bound status as purposeful. Not only was Ashely accessing the shape of broken wing 2 - 3 times a day to soften her grief, she began writing heartfelt letters of gratitude to her family and close inner circle of friends. She reported to our team that writing letters to her loved ones became her intention after she gave her grieving body attention through movement. In the midst of devastating disease and its terminal trajectory, Ashely was able to love through her actions, her written words, and her memory-making intention of letter writing. Research is proving that to ease trauma and suffering at end of life, integration of both cognitive and somatic strategies is optimal. Ashely welcomed conversations and participated in her spiritual and emotional growth through journaling and letter writing, even as disease was swiftly dissolving her physical body. She cognitively metabolized that her life on this earth would be brief through letter writing as her legacy. Ashely allowed movement and body shapes to soften her muscles and bones that we believe allowed her access to her emotions and aided in her optimal physical comfort. Yes, traditional opioid medications eased her physical pain. Her bone deep suffering found creative outlets through transparent writings of her emotions and the love she held for others. Compassionate inquiry gave us insight of what was of most important to Ashely, thereby allowing us to implement somatic strategies that best suited her inherent needs to enhance her life.

Ashely died in the arms of her father, on his birthday. She had written 12 letters in all and asked that each letter be distributed after her death. At the end of each tender letter of gratitude to those she loved most, she asked her loved ones to remember life as a shooting star. She went on to write that we only get one brief moment to shine as bright as we can. Ashely asked each of her letter recipients to find ways to let their life shine bright, in her honor, for all to see.

Pain & Symptom Management: Healing Through Art Counseling

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Pain is a real human condition. Although many individuals seek not to address the suffering associated with pain, this is often unavoidable. This especially holds true when dealing with the dying process of a child. Family members may not exhibit somatic forms of pain that can often respond to medicinal treatments, however they often cope with psychogenic pain which can fester in the form of grief if left untreated. Art counseling plays an important role in mitigating the intensity that exists and can provide comfort throughout the dying process.

All pain is not the same. The current understanding espoused by the International Association for the Study of Pain (IASP) is one based on physiologic understanding which defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" (Raja, 2020). In other words, pain is often linked to acts that cause corporeal damage such as traumatic bodily injury. Pain, however, also stems from social, emotional, and psychological stimuli as well. It is now well understood that "social isolation, including rejection, abandonment, and loss, may have acquired the capacity to trigger pain affect in a similar manner as nociceptive indices of tissue damage" (Frumkin, 2021). A family member witnessing a child's dying process may not necessarily suffer the physical pain that the child undergoes, but most certainly will experience their own form of suffering while witnessing the same events that unfold. Options to treat psychological suffering include utilizing medicinal intervention, providing bereavement services, and considering more specific modalities which include art counseling.

David Labrum, a respected licensed mental health counselor (LMHC), photographer, and artist is a proponent of the healing that art counseling provides for the bereaved. He aids those at the Center for Hospice Care, in Mishawaka, Indiana, and understands that the process is often "work" whereby growth is measured in larger time periods and often free of immediate results (Personal Communication, July 2023). Many of his clients are parents who have lost children from some form of chronic ailment or acute tragedy and enter counseling with different needs and expectations. The counseling consists of a 1:1 modality between Dave and the client and is not within the context of group interaction. Even couples remain separated during their own private sessions. Visits usually take place on a weekly calendar and each interval lasts for one or two hours. The client performs the artwork on paper medium against a corresponding wall while avoiding any teaching during that said time. However, after the artwork is complete, support is given in the form of a story board. The client describes what he or she feels through his or her painting. Real tears fall and healing proceeds with each new creation. Meanwhile, a paradoxical shift occurs within the client. He or she is gradually able to focus on his or her own issues and not necessarily those associated with the one who is bereaved. David considers this change of event as one that is both "transformative" and "redemptive" in nature (Personal Communication). The client becomes psychologically stronger and establishes a more consistent set of boundaries for him or herself. Boundary formation helps to provide limitations which then permits the development of necessary space in order to deal with the pain in microsegments and not as a flood of emotions all at one time.

One can get a sense of how this process plays out while reading *I Can Breathe Now*. The book contains several paintings created by one of the mothers named Maggie while working with David Labrum. She lost her son

unexpectedly in November 2012 and art became her medium for release starting eight months afterwards. The paintings personify not only grief and sorrow, but real strength and the pursuit of release from the pain that was inflicted upon her. Although not all of the paintings are included in this article, those mentioned help to tell the mother's story and to demonstrate the role that art counseling provides in the management of human suffering. You can hear that truth best validated in her own words which state, "Once a week, I stood in front of a blank canvas in the Art Studio and turned my thoughts and feelings into paintings" (Bair, 2013). Please consider utilizing art counseling in some form for your own patients in the future.

Final note: The titles of these paintings and the associated comments made to each are my own and not that of anyone associated with the book including David Labrum. I read the comments made by the painter and adapted my own thoughts afterwards. Thank you.

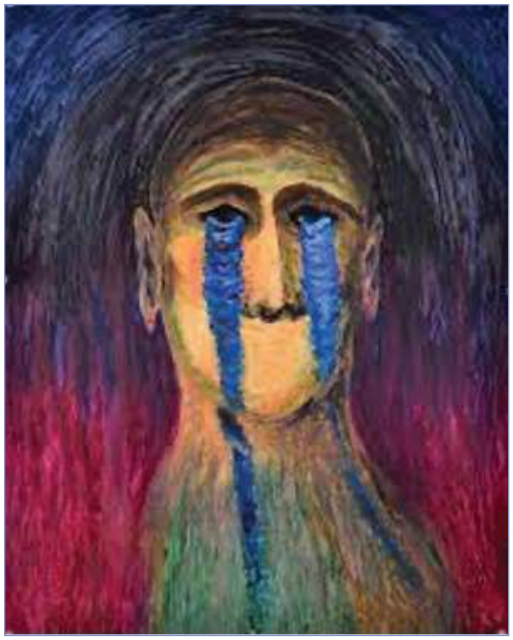
First Painting (July 2013): After The Loss of Her Son

Sobbing in front of the art studio wall, numb to the events, frozen in pain and ready for release.

Explosions of Grief (September 2013): Missing The Son Who Would Not Return

Anguish of not being able to assist her son while crying in a grocery store parking lot.

Son's Image (January 2014): Unable to Speak



According to the artist, this was the hardest painting for her to complete in that her son could not relate his feelings to anyone as his personality depicted in blue slowly drained out of him.

Rings of Pain (April 2014): Inability To See One Another

Unable to speak and communicate, distorted views derived from the son's mental ilness, Maggie's grasp for any connection.

A Losing War (July 2014):

Unable to reach her son despite all of her attempts and efforts. Alone, tired, and ready to give in.

Chained to Pain (August 2014):

Unable to free herself from the pain of losing her son, straining to be free but to no avail.

I Can Breathe Again (December 2015): God's Divine Intervention

A renewed faith is established after struggling with the constant battle of Maggie's own personal grief. She lost the physical presence of her son, yet she mentions that God had helped her to regain acceptance of the situation. For her, subsequent hope begins anew in the presence of the love and comfort found in His waiting arms.

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Spiritual Support and Compassion: Essential Elements of Holistic Care

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Spiritual support and compassion are valuable resources to assist in managing pain and symptoms. Compassionate presence and spiritual support may provide hope to promote an environment of peace that can positively impact the pain experience and perception. Compassion in action is a virtuous response to seek to mitigate the suffering of another. "It is a vessel for the expression of the human spirit."1 An authentic presence, with humble curiosity to support that which is held important to the individual may assist in building trust and providing hope and comfort during difficult moments. Spiritual care invites the caregiver to meet the patient and family where they are with respect through a lens of holistic care.[1]

Regardless of the symptoms, spiritual care and support are an essential component of holistic care. A fundamental aspect of humanity is the capacity to experience existential or spiritual suffering.[2] Addressing spiritual concerns and existential suffering can play a key role in helping to manage pain, mitigate suffering, and be a source of coping for some individuals. These can be great sources of strength which can complement medical and non-medical management. They may transcend the perception and enhancement of the pain experience and be a source of hope and strength even in difficult moments. By witnessing and being present to those who may be suffering, with ongoing assessment that which is sacred to the patient and family may be supported within the care plan. 1

Guidelines as outlined by the National Consensus Project for Quality Palliative Care 4th edition,

"Domain 5: Spiritual, religious, and existential aspects of care. Spirituality is a fundamental aspect of compassionate, patient and family-centered palliative care. It is a dynamic and intrinsic aspect of humanity through which individuals seek meaning, purpose, and transcendence, and experience relationship to self, family, others, community, society, and the significant or sacred. Spirituality is expressed through beliefs, values, traditions, and practices. Teams are also respectful when patients and families decline to discuss their beliefs or accept spiritual support."[3]

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Nausea/Vomiting

Nausea Vomiting (PLAY)

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There are a variety of tools that are accessible to children in the form of distraction or redirection, especially with play. Child Life Specialists and play practitioners/therapists offer the ability to re-engage the child through a preferred activity that can override the symptom burden of nausea or vomiting. Through this play, the child is engaged in something other than the symptom experience and may report less awareness and/or focus on the symptom itself. Further, there can be a development of shame or embarrassment surrounding the experience of feeling nauseous or vomiting in front of others. There may also be an additional fear that experiencing this, or any other, symptom means that the child isn't being "strong." Play provides a non-threatening manner to explore these fears and emotions, normalizing the experience, and acting out any insecurities that may exist. This may, therefore, also decrease the degree to which the child is experiencing the symptom.

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Nausea/Vomiting: Child life support during an episode of nausea/vomiting can include support for breath work, guided meditation, or distraction. Engaging a child in their ability to use breathing techniques to calm their body can provide some support until pharmacologic intervention is available to help disperse adverse feelings. Guided meditation is useful to support a child focusing on other things, allowing them to focus more in-depth with creating the scene in their mind rather than the physical sensations of their body.

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Nausea/Vomiting are complex symptoms often accompanied by abdominal discomfort as a physical component of a diagnosis, a response to pharmaceutical treatments, or generated by emotional distress. With very minimal research on the subject, no treatment plan has been devised to address the symptoms or etiology. When nausea and vomiting are an expected consequence, Child Life interventions have proven to be effective measures for emotional regulation through information, comfort positions, and allowing some level of participation by the child, thereby achieving an increase in a positive physicalresponse. By addressing somatic and psychosocial aftereffects, child life expressive interventions offer an opportunity to process the effects of the event, minimize anticipatory anxiety, and relax the body and mind, thereby creating a more positive outcome and a cooperative patient.

Managing Nausea and Vomiting in Children

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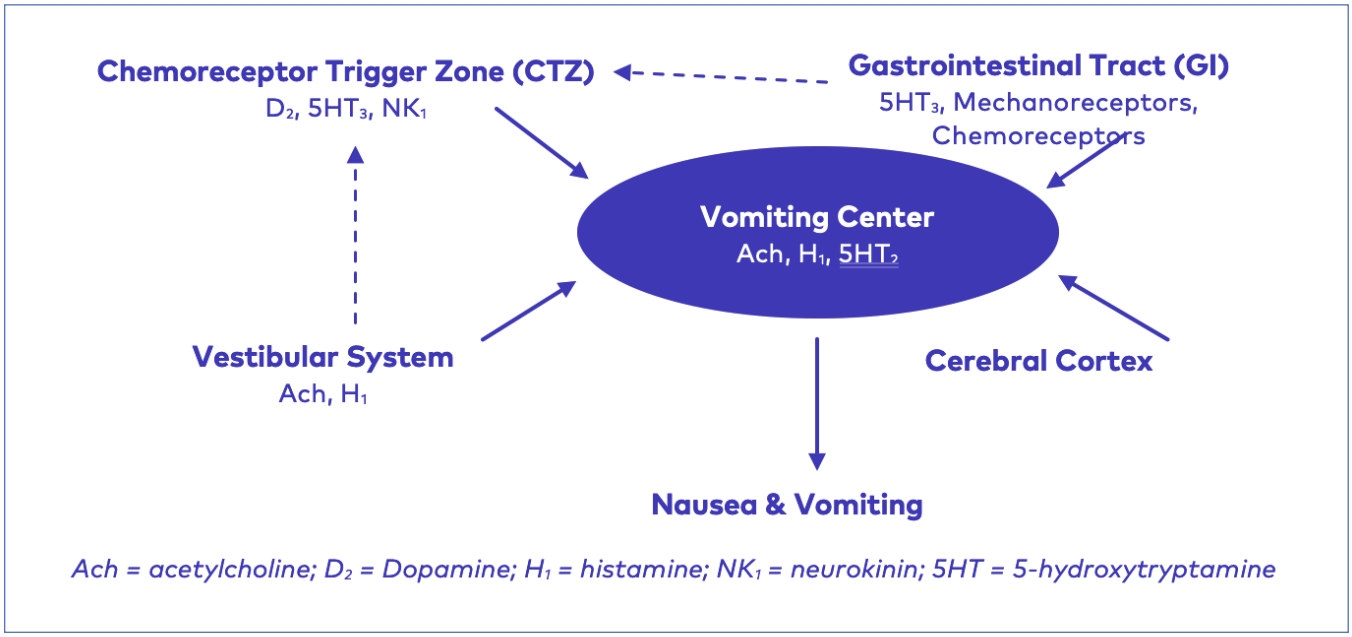
Introduction and Background[1-6]

- Nausea is an unpleasant feeling of needing to vomit often accompanied by autonomic symptoms of pallor, cold sweats, salivation, tachycardia, and diarrhea. Nausea can range from a mild stomach upset to complete loss of appetite.
- Retching presents as spasmodic movements of the diaphragm and abdominal muscles that may progress to vomiting. Vomiting is a complex process of involuntary spasms, resulting in the reflux of gastric contents through the mouth.
- Chronic nausea can be defined as lasting longer than a week without a well-defined or self-limiting cause, such as chemotherapy, radiation, or infection.
- Children are at a higher risk of developing consequences of prolonged nausea and vomiting (e.g. dehydration, electrolyte disturbances, etc.). Recognize and correct consequences as appropriate.
- The GI tract and brain are the two organ systems involved with nausea and vomiting. The primary neurotransmitters that mediate these systems include dopamine, histamine, acetylcholine, and serotonin.
- The pathophysiology of nausea and vomiting is complex. The vomiting center located in the brain receives input from various areas within the brain as well as from the gastrointestinal tract. The cause of nausea and vomiting might be multifactorial. The figure below indicates the four major mechanisms for stimulation of the vomiting center (Figure 1).

Figure 1. Mechanisms Involved in Nausea and Vomiting



Prevalence[6]

- Studies suggest 40- 63% of children receiving palliative care will suffer from nausea and/or vomiting.

Causes[1-2,7]

- Major causes of chronic nausea include:
- Anxiety
- Autonomic dysfunction
- Bowel obstruction
- Constipation
- Gastrostasis
- Infections
- Increased intracranial pressure (ICP)
- Pain
- Medications
  - Antibiotics
  - Nonsteroidal anti-inflammatory drugs (NSAIDs)
  - Chemotherapy
  - Opioids
  - Overdoses/Withdrawals
- Metabolic disorders (e.g. hypercalcemia, renal failure)
- Radiation
- Reflux

Assessment

- Onset
  - Timing, acute, anticipatory, delayed
- Duration
  - Prolonged vomiting in children is defined as > 12 hours in a neonate, > 24 hours in children younger than 2 years of age, or > 48 hours in older children.
  - Etiology
  - Assessing etiology of nausea and vomiting is a step-by-step process
  - Table 1 provides a thorough assessment strategy based on patient symptom presentation
    - Once potential causes are established, determine underlying mechanism
  - Table 2 links common etiologies by age groups and mechanisms
  - Tables 3 & 4 guide initial therapy based on mechanism of nausea
- Severity[8-9]
  - Baxter Retching Faces (BARF) Scale (Figure 2)[8]
    - Pediatric nausea assessment scale with preliminary validation in patients aged 7 to 18
    - Can assist clinicians in identifying a need for or assessing effectiveness of therapy
    - Prompt questions to consider:
      1. "Have you ever felt bad enough that what you ate came back out of your mouth?
      2. "What do you call it when that happens?"
      3. "What do you call the feeling when you feel like you might ____(use patient's answer to question 2)?" We call this feeling nausea.
      4. "These faces show children who feel no "nausea" (use patient's answer to question 3), who feel a little bit of "nausea", who feel even more "nauseated", and these are children who have the most "nausea" it is possible to feel." [Point to each corresponding face.] "Which face is more like how you feel right now?"

Figure 2. BARF Nausea Scale[8]

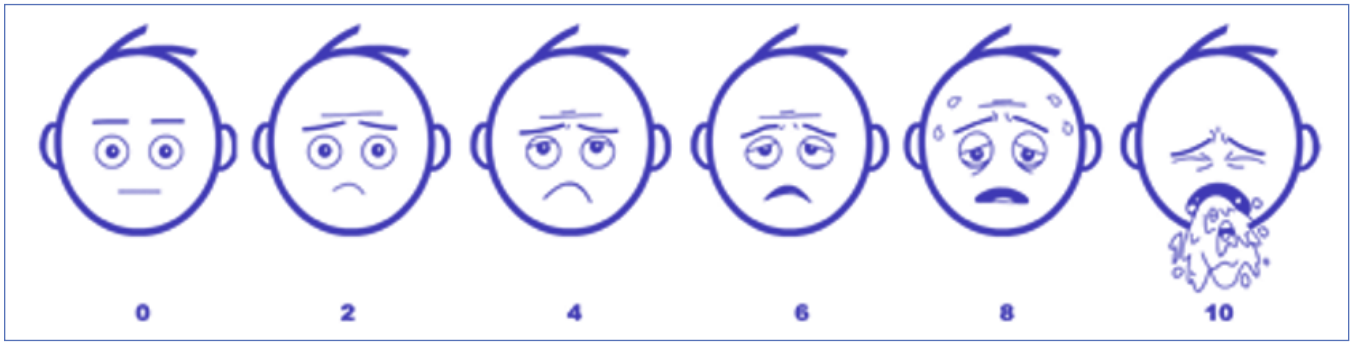


Table 1. Patient Evaluation to Determine Potential Etiologies[1-5,10-12]

Presentation of Symptoms	Possible Causes of Nausea & Vomiting
Onset	**Assess for**
Abrupt	Cholecystitis, food poisoning, gastroenteritis, pancreatitis, medications
Insidious	Reflux, gastroparesis, medications, metabolic disorders, pregnancy
Pattern	**Assess for**
Large, infrequent vomitus that relieves nausea	Complete or partial bowel obstruction
Small-volume emesis	Gastric stasis
Projectile	Pyloric stenosis
Effortless, regurgitation	Reflux, rumination syndrome
Timing	**Assess for**
Before breakfast	↑ ICP, pregnancy, uremia
During or directly after eating	Pyloric stenosis, peptic ulcer disease, psychiatric causes
1-4 hr after meal	Dyspepsia, peptic ulcer disease, neoplasms, gastroparesis
Continuous	Conversion disorder, depression
Nature of vomited matter	**Assess for**
Undigested food	Achalasia, esophageal disorders
Partially digested food	Gastric outlet obstruction, gastroparesis
Bile	Proximal small bowel obstruction
Feculent or odorous	Fistula, obstruction
Large Volume	Organic cause
Coffee-ground or bright red blood	GI bleed, ulcer, gastritis
Mucus	Upper respiratory infection, allergies, reflux
Abdominal pain	**Assess for**
Right upper quadrant	Gallbladder disease, liver disease
Epigastric	Dyspepsia, pancreatic disease, peptic ulcer disease
Right lower quadrant	Appendicitis
Severe pain	Biliary disease, pancreatic disease, peritoneal irritation, small bowel obstruction
Severe pain that proceeds vomiting	Small bowel obstruction
Associated symptoms	**Assess for**
Weight loss	Malignancy, gastric outlet obstructions, peptic ulcer disease
Diarrhea, myalgias, malaise, headache	Viral
Headache, stiff neck, vertigo, focal neurologic deficits	↑ ICP, encephalitis/meningitis, head injury, mass, migraine
Early satiety, postprandial bloating, abdominal discomfort	Gastroparesis
Repetitive migraine headaches or symptoms of irritable bowel syndrome	Cyclic vomiting syndrome
Vertigo and symptoms associated with movement	Vestibular dysfunction

Presentation of Symptoms	Possible Causes of Nausea & Vomiting
Morning symptoms with morning headache and neurological symptoms	↑ ICP
Polyuria, polydipsia	Hyperglycemia or hypercalcemia
Altered mental status	Uremia, hyponatremia, or ↑ ICP
Syncope episodes, early satiety	Autonomic insufficiency
Decreased frequency of bowel movements, abdominal fullness, hard stools, straining	Constipation
Worry, emotional responses	Anxiety
Physical Exam	**Assess for**
Masses	Evaluate location and size
Bowel Sounds and abdominal distention	Bowel obstruction, ileus, or constipation
Calluses on dorsal surfaces of hands	Bulimia
Jaundice	Kernicterus, liver failure, urinary tract infection (UTI)
Poor skin turgor, delayed capillary refill, tachycardia, hypotension	Signs of dehydration
Papilledema, neurological signs	↑ ICP
Fecal impaction, rectal examination	Constipation

Table 2. Age-Dependent Possible Etiologies of Vomiting[3-4,13]

	Neonates	Infants	Children	Adolescents
Cerebral Cortex	**Increased ICP:** ▮ Encephalitis ▮ Hydrocephalus ▮ Mass lesion ▮ Meningitis ▮ Subdural hematoma ▮ Kernicterus	**Increased ICP:** ▮ Encephalitis ▮ Hydrocephalus ▮ Mass lesion ▮ Meningitis	▮ Abdominal migraine ▮ Cyclic vomiting ▮ Fear, anxiety **Increased ICP:** ▮ Encephalitis ▮ Head injury ▮ Mass lesion ▮ Meningitis	▮ Abdominal migraine ▮ Adolescent rumination syndrome ▮ Cyclic vomiting ▮ Fear, anxiety **Increased ICP:** ▮ Encephalitis ▮ Head injury ▮ Mass lesion ▮ Meningitis ▮ Migraines ▮ Pseudotumor cerebri Psychogenic vomiting
CTZ	▮ Inborn errors of metabolism **Infection:** ▮ UTI ▮ Sepsis ▮ Medications ▮ Milk allergy ▮ Urea cycle defects	▮ Congenital adrenal hyperplasia **Infection:** ▮ Otitis media ▮ Pneumonia ▮ Pertussis ▮ Sepsis ▮ UTI ▮ Ingestion accidents ▮ Medications	▮ Adrenal crisis ▮ Diabetic ketoacidosis (DKA) **Infection:** ▮ Otitis media ▮ Pharyngitis ▮ Pneumonia ▮ Sepsis ▮ UTI ▮ Ingestion accidents ▮ Medications	▮ DKA **Infection:** ▮ Pharyngitis ▮ Pneumonia ▮ Sepsis ▮ Ingestions ▮ Medications ▮ Pregnancy

	Neonates	Infants	Children	Adolescents
GI Tract	▮ Excessive feeding volume ▮ Gastroesophageal reflux ▮ Hepatobiliary disease ▮ Necrotizing enterocolitis (NEC) **Obstruction:** ▮ Esophageal stenosis ▮ Hirschsprung's disease Incarcerated hernia ▮ Intestinal stenosis ▮ Meconium ileus ▮ Pyloric stenosis ▮ Tracheoesophageal fistula ▮ Volvulus ▮ Paralytic ileus ▮ Peritonitis ▮ Thrush	▮ Celiac disease ▮ Cholecystitis ▮ Constipation ▮ Eosinophillic esophagitis ▮ Gastroenteritis ▮ Gastroesophageal reflux ▮ Hepatobiliary disease **Obstruction:** ▮ Foreign bodies ▮ Incarcerated hernia ▮ Intussusception ▮ Meckel's Diverticulum ▮ Pyloric stenosis ▮ Volvulus ▮ Thrush	▮ Appendicitis ▮ Celiac disease ▮ Cholecystitis ▮ Constipation ▮ Dyspepsia ▮ Eosinophilic esophagitis ▮ Gastroenteritis ▮ Gastroesophageal reflux ▮ Gastroparesis ▮ Hepatitis ▮ Inflammatory bowel disease **Obstruction:** ▮ Foreign bodies ▮ Incarcerated hernia ▮ Intussusception ▮ Meckel's diverticulum ▮ Volvulus ▮ Pancreatitis ▮ Peptic ulcer ▮ Peritonitis	▮ Appendicitis ▮ Cholecystitis ▮ Constipation ▮ Dyspepsia ▮ Gastroenteritis ▮ Gastroesophageal reflux ▮ Gastroparesis ▮ Hepatitis ▮ Inflammatory bowel disease **Obstruction:** ▮ Incarcerated hernia ▮ Meckel's diverticulum ▮ Volvulus ▮ Pancreatitis ▮ Peptic ulcer disease ▮ Peritonitis
Vestibular			▮ Motion sickness	▮ Motion sickness

Clinical Characteristics[1-6]

- **Chemoreceptor trigger zone** (CTZ) is located in the area postrema of the medulla. Nausea and vomiting are stimulated here by chemotherapeutic agents, bacterial toxins, metabolic products (e.g. uremia), and opioids. Dopamine (D2), serotonin (5-HT), and neurokinin-1 are the primary neurotransmitters involved in this process. Therapy is based on blocking D2 with dopamine antagonists including butyrophenones (haloperidol), phenothiazines (chlorproMAZINE, prochlorperazine, promethazine), and metoclopramide. 5-HT3 antagonists (ondansetron), also active here, are mainly used for chemotherapy and radiotherapy-induced nausea. 5-HT3 antagonists also have a multitude of safety and efficacy data in pediatric patients of all ages, with lower risk of side effects than other classes.
- **Cerebral Cortex** induced nausea and vomiting can be caused by anxiety, taste, and smell, as well as increased ICP. Corticosteroids are useful to decrease ICP. Anxiolytics, such as benzodiazepines, are used to treat "anticipatory" nausea and gustatory and olfactory over-stimulation.
- **Vestibular** nausea and vomiting is triggered by motion. Opioids can sensitize the vestibular center, resulting in movement-induced nausea. Ambulatory patients are more susceptible to vestibular nausea and vomiting than bedbound patients. Since histamine (H1) and acetylcholine (ACh) are the predominate neurotransmitters, antihistamines (diphenhydrAMINE), and anticholinergics (glycopyrrolate, hyoscyamine) are the drugs of choice in movement-induced nausea and vomiting.
- **Gastrointestinal (GI) tract stimulation** occurs through vagal and sympathetic pathways. These pathways can be triggered by stimulation of either mechanoreceptors or chemoreceptors located in the gut. Gastric stasis, gastrointestinal obstruction, medications, metastatic disease, bacterial toxins, chemotherapeutic agents, and irradiation, can lead to nausea and vomiting. Glossopharryngeal or vagus nerve stimulation in the pharynx by sputum, mucosal lesions, or infection can also evoke nausea. The major neurotransmitters in the upper GI tract are D2, acetylcholine, and 5-HT. Metoclopramide blocks 5-HT4 (at high doses) and increases gastric motility above the jejunum. Anticholinergics decrease both GI spasticity and motility in nausea induced by gut hyperactivity.

- **Autonomic failure** causes gastroparesis resulting in anorexia, nausea, early satiety, and constipation. Delayed gastric emptying is frequently observed in patients with diabetes mellitus, chronic renal failure, and neurological disorders. Malnutrition, cachexia, lung and pancreatic cancers, human immunodeficiency virus, radiotherapy, and drugs such as opioids, anticholinergics, antidepressants, and vasodilators have been associated with autonomic failure and resulting chronic nausea, poor performance, tachycardia, and malnutrition.

Non-Pharmacological Treatment[1-2,5-6,10]

- Acupressure or acupuncture
- Avoid strong odors, foods, or other triggers
  - Try pleasant masking aromas of the child's choosing
- Eliminate offending medications if possible
- Play/distraction: music, games, storytelling, art projects, television
- Promote good oral care
- Offer clear liquids
  - Sip liquids slowly
  - Sipping off a spoon may prevent gulping
- Provision of small, frequent meals chosen by the child
  - Cold foods may be better tolerated
  - Promote bland foods: mashed potatoes, apple sauce, sherbert, crackers, toast
  - Avoid greasy, fried, or spicy foods
- Relaxation techniques
  - Younger children may need a parent to cue them and help with guided imagery and stories
  - Older children can be taught self-hypnosis
- Oral Rehydration Therapy (ORT) if prolonged vomiting (see Diarrhea PediGEMS)

Pharmacotherapy[6]

- Age of the patient, combined with the clinical features of nausea and vomiting, should guide the choice of antiemetic used.
- Initial approach should be based on pathophysiology of the nausea and vomiting and mechanism of action of the agent (Table 3).
- If initial approach is unsuccessful:
  - Ensure first line agent dose is optimized
  - Rotate to a different agent based on mechanism and/or
  - Substitute a phenothiazine, such as promethazine (Phenergan), for both H1 and D2 receptor antagonism and/or
  - Consider adding a corticosteroid burst, such as dexamethasone (Decadron) and/or
  - Consider adding a low dose benzodiazepine, such as LORazepam (Ativan)

Table 3. Pathophysiology Based Approach to Management of Nausea and Vomiting

Mechanism of Nausea	Class	Receptor	Medication
CTZ	5-HT_3 antagonist Antiemetic Butyrophenones	5-HT_3 D_2 D_2	ondansetron (Zofran) metoclopramide (Reglan) haloperidol (Haldol)
GI	Prokinetic Macrolide	5-HT4	metoclopramide (Reglan) erythromycin (E-Mycin)
Cerebral Cortex: ↑ ICP	Corticosteroid	-	dexamethasone (Decadron)
Cerebral Cortex: Anxiety	Benzodiazepine Antihistamine	GABA H_1	LORazepam (Ativan) hydrOXYzine (Vistaril)
Vestibular	Antihistamine Anticholinergic	H_1 ACh	promethazine (Phenergan) or diphenhydrAMINE (Benadryl) glycopyrrolate (Robinul) or hyoscamine (Levsin)

Clinical Pearls

- Recognize and correct consequences of prolonged vomiting (e.g. dehydration, electrolyte disturbances) as appropriate for patient goals, as these may occur quickly in children.
- Potentially reversible causes of nausea and vomiting should not be overlooked (e.g. anxiety, constipation, gastroesophageal reflux (GER), medications, pain, peptic ulcer disease, bowel obstruction).
- Refractory cases of nausea and vomiting often require judiciously selected combinations of medications from different classes.
- Short courses of corticosteroids may have a role in non-specific nausea and vomiting in addition to their usefulness in reducing intracranial pressure. The mechanism of this action is unknown.[17] Risks and benefits should be weighed for long-term use in pediatric palliative medicine.
- Children tend to exhibit more extrapyramidal side effects from phenothiazines (chlorproMAZINE, prochlorperazine, promethazine), especially when given during acute viral illnesses.[18] Promethazine has activity similar to antihistamines and therefore may be the best option in this class, although it does have a black box warning in those less than two years of age for fatal respiratory depression.[19]
- DiphenhydrAMINE (Benadryl) can be used to treat EPS from phenothiazines. Antihistamines are not approved for use in less than two years of age; use cautiously in children less than six years of age.[20]
- Serotonin antagonists have been shown safe and effective in children of all ages, particularly postoperatively or in conjunction with chemotherapy. These agents also lack the extrapyramidal side effects seen with many other antiemetic agents.[16]

Table 4. Pharmacological Management of Nausea and Vomiting[14]

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Chemoreceptor Trigger Zone Nausea			
haloperidol (Haldol)[15] > 3 yoa Injection: > 18 yoa	0.01-0.1 mg/kg q8h **Adult:** 0.5-1 mg q12h or q4-6h prn	**PO** **SL** **PR** **IM** **SQ**	**Solution:** 2 mg/mL **Tablets:** 0.5, 1, 2, 5, 10, 20 mg **Injection (lactate):** 5 mg/mL ▮ Avoid contact with oral solution and skin, may cause contact dermatitis ▮ Dilute oral solution with water or acidic beverage ▮ Consider parenteral use only in older children ▮ Injection contains benzyl alcohol ▮ Protect all dosage forms from light
	▮ Butyrophenone; potent D2 antagonist ▮ Useful in phenothiazine allergy or intolerance ▮ Reserve use in children <3 yoa to those who are unresponsive to other antiemetics ▮ EPS more common in younger patients, but rare in low doses ▮ Warning: QT prolongation ▮ Less sedating than other antiemetics ▮ Lowers seizure threshold		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
metoclopramide (Reglan) No age restriction	0.1-0.2 mg/kg q 6h **Adult:** 10 mg ▮ Up to 1 mg/kg for D2 antagonist or chemotherapy induced ▮ Administer 30 minutes before meals & bedtime	**PO** **PR** **IV** **IM** **SQ**	**Solution:** 5 mg/5 mL **Tablets:** 5, 10 mg **Tablets, ODT:** 5, 10 mg (no generic) **Injection:** 5 mg/mL ▮ Some products contain sodium benzoate
	▮ D2 - receptor antagonist & 5-HT4 agonist at higher doses ▮ Prokinetic: useful if gastric stasis present ▮ EPS more common in children. May administer diphenhydrAMINE for EPS prevention. Concurrent administration with anticholinergic agents (e.g. diphenhydrAMINE) will decrease prokinetic effect, but not antiemetic effect. ▮ Black box warning: irreversible tardive dyskinesia, especially at higher doses ▮ Contraindication: complete bowel obstruction ▮ SE: sedation, confusion		
ondansetron (Zofran)16 >1 month	0.1-0.15 mg/kg q6-8h **Max:** 4-8 mg/dose **High dose:** 0.45 mg/kg 30 minutes prior to emetogenic chemotherapy **Max:** 16 mg/dose **Adult:** 4-8 mg	**PO** **SL** **PR** **IV**	**Solution:** 4 mg/5 mL **Tablets:** 4, 8 mg **Tablets, ODT:** 4, 8 mg **Film, soluble:** 4, 8 mg (not generic) **Injection:** 2 mg/mL **Infusion, premixed in D5W or NS:** 32 mg/50 mL ▮ Oral solution contains sodium benzoate ▮ ODT contains phenylalanine
	▮ 5-HT3 receptor antagonist ▮ May induce nausea at high doses ▮ SE minimal: headache, constipation		
Chemoreceptor Trigger Zone Nausea: Phenothiazines			
chlorproMAZINE (Thorazine) >6 months	0.5-1 mg/kg q4-6h **Max Dosing:** **<5 yoa:** 40 mg/day **5-12 yoa:** 75 mg/day **Adult:** 10-25 mg ▮ PO dosed more frequently	**PO** **SL** **PR** **IM** **IV**	**Tablets:** 10, 25, 50, 100, 200 mg **Injection:** 25 mg/mL ▮ Tablets contain benzoic acid ▮ For direct IV injection, dilute with NS to max concentration: 1 mg/mL & infuse at rate NTE 0.5 mg/minute ▮ Do not administer SQ (tissue damage)
	▮ Warning: QT prolongation ▮ Adjust dose in hepatic impairment ▮ Caution: chronic respiratory diseases ▮ May lower seizure threshold ▮ SE: EPS (common in pediatric patients), sedation		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
prochlorperazine (Compazine) >2 yoa	**PO, PR:** 0.1 mg/kg q6-8h **Adult:** 10 mg PO q4-6h prn, 25 mg PR q6-12h prn **IM, IV:** 0.1-0.15 mg/kg q8-12h, NTE 40 mg/day **Adult:** 5-10 mg	**PO** **PR** **IM** **IV**	**Tablets:** 5, 10 mg **Injection:** 5 mg/mL **Suppositories:** 25 mg ▮ Injection contains benzyl alcohol ▮ Do not administer SQ (tissue damage)
	▮ Reserve use in children <5 yoa to those who are unresponsive to other antiemetics ▮ May lower seizure threshold ▮ SE: EPS (common in pediatric patients), sedation		
promethazine (Phenergan) >2 yoa	0.25-1 mg/kg q4-6h prn **Max:** 25 mg/dose **Adult:** 12.5-50 mg	**PO** **PR** **IM**	**Syrup:** 6.25 mg/5 mL **Tablets:** 12.5, 25, 50 mg **Injection:** 25, 50 mg/mL **Suppositories:** 12.5 mg, 25 mg, 50 mg ▮ Do not give IV or SQ
	▮ Black box warning in <2 yoa due to risk of fatal respiratory depression ▮ Avoid IV administration -risk of extravasation ▮ SE: EPS, sedation, lower seizure threshold		
Gastric Stasis Nausea			
erythromycin (E-Mycin)	2.5 mg/kg q6h **Adult:** 125-250 mg ▮ Administer before meals and bedtime	**PO**	**Suspension:** 200 mg/5 mL **Capsules, Tablets:** 250 mg ▮ Chewable tablets should not be swallowed whole ▮ DR & EC tablets should not be broken or chewed ▮ Avoid IV administration, associated with fatal complications ▮ IV contains benzyl alcohol
	▮ Reserve for patients who cannot tolerate metoclopramide ▮ SE: diarrhea		
metoclopramide (Reglan)	0.1-0.2 mg/kg q 6h **Adult:** 10 mg ▮ Up to 1 mg/kg for D2 antagonist or chemotherapy induced ▮ Administer 30 minutes before meals & bedtime	**PO** **PR** **IM** **IV**	**Solution:** 5 mg/5 mL **Tablets:** 5, 10 mg **Tablets, ODT:** 5, 10 mg (no generic) **Injection:** 5 mg/mL ▮ Some products contain sodium benzoate
	▮ D2 - receptor antagonist & 5-HT4 agonist at higher doses ▮ Prokinetic: useful if gastric stasis present ▮ EPS more common in children. May administer diphenhydrAMINE for EPS prevention. Concurrent administration with anticholinergic agents (e.g. diphenhydrAMINE) will decrease prokinetic effect, but not antiemetic effect. ▮ Black box warning: irreversible tardive dyskinesia, especially at higher doses ▮ Contraindication: complete bowel obstruction ▮ SE: sedation, confusion		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Vestibular Nausea: Antihistamines (not recommended <2 yoa)			
dimenhyDRINATE (Dramamine) >2 yoa	1.25 mg/kg q6-8h **Max Dosing:** **2-5 yoa:** 75 mg/day **6-12 yoa:** 150 mg/day **Adult:** 50-100 mg **Adult Max:** 400 mg/day	**PO** **IM**	**Tablets:** 50 mg **Tablets, chewable:** 25, 50 mg **Injection:** 50 mg/mL ▮ Injectable solution contains benzyl alcohol ▮ IV route not recommended in children ▮ Chewable tablet contains phenylalanine
	▮ Serious adverse reactions have been reported in <2 yoa (respiratory depression, seizures) ▮ SE: paradoxical excitation, constipation, sedation		
diphenhydrAMINE (Benadryl) >2 yoa	0.5-1 mg/kg q4-6h **Max:** 50 mg/dose **Adult:** 25- 50 mg **Alt dosing regimen:** **2-5 yoa:** 6.25 mg q4-6h **Max:** 37.5 mg/day **6-11 yoa:** 12.5-25 mg q4-6h **Max:** 150 mg/day **>12 yoa:** 25-50 mg q4-6h **Max:** 300 mg/day	**PO** **PR** **IM** **IV**	**Solution:** 12.5 mg/5 mL **Tablets, Capsules:** 25, 50 mg **Strip, Tablet, ODT:** 12.5, 25 mg (not generic) **Injection:** 50 mg/mL ▮ IV: Dilute to 25 mg/mL, infuse over 10-15 min
	▮ Serious adverse reactions have been reported in <2 yoa (respiratory depression, seizures) ▮ SE: paradoxical excitation, constipation, sedation		
hydrOXYzine (Atarax, Vistaril) >2 yoa	0.5-1 mg/kg q6h **Adult:** 10-25 mg	**PO** **IM**	**Solution :** 10 mg/5 mL (Atarax), 25 mg/5 mL (Vistaril) **Tablets:** 10, 25, 50 mg **Capsules:** 25, 50, 100 mg **Injection:** 25, 50 mg/mL ▮ IM painful; IV not recommended ▮ Injection contains benzyl alcohol
	▮ Serious adverse reactions have been reported in <2 yoa (respiratory depression, seizure) ▮ SE: paradoxical excitation, sedation ▮ Atarax (hydrOXYzine HCL) and Vistaril (hydrOXYzine pamoate) are different forms of same active drug		
meclizine (Antivert) >12 yoa	12.5- 25 mg q8h	**PO**	**Tablets:** 12.5, 25 mg **Tablets, chewable:** 25 mg
	▮ SE: sedation, constipation		
promethazine (Phenergan) >2 yoa	0.25-1 mg/kg q4-6h prn **Max:** 25 mg/dose **Adult:** 12.5-50 mg	**PO** **PR** **IM**	**Syrup:** 6.25 mg/5 mL **Tablets:** 12.5, 25, 50 mg **Injection:** 25, 50 mg/mL **Suppositories:** 12.5, 25, 50 mg ▮ Do not give IV or SQ
	▮ Paradoxical excitation may occur in infants ▮ Caution: children with Down's syndrome, spastic paralysis, brain injury, or renal disease ▮ Least likely to cross blood-brain barrier; causes less confusion and visual changes ▮ Drying effect ~5x as potent as atropine[96]		

<table>
<tr><th>Medication & Age Guide*</th><th>Typical Starting Dose**</th><th>Routes</th><th>Pediatric Formulation Considerations</th></tr>
<tr><td colspan="4">Vestibular Nausea: Anticholinergics</td></tr>
<tr><td>dicyclomine
(Bentyl)

>6 months</td><td>6 mon - 2 yoa: 5 mg q6-8h
> 2 yoa: 10 mg q6-8h
Adult: 20 mg q6-8h</td><td>PO
IV</td><td>Syrup: 10 mg/5 mL (not generic)
Capsule: 10 mg
Tablet: 20 mg
Injection: 10 mg/mL</td></tr>
<tr><td></td><td colspan="3">▮ Contraindicated in <6 months due to serious adverse effects (respiratory distress, seizures, syncope)
▮ Caution: Down's syndrome, spastic paralysis, or brain damage (increased sensitivity to toxic effects)</td></tr>
<tr><td>glycopyrrolate
(Robinul)</td><td>PO: 40-100 mcg/kg q6-8h
Adult: 1-2 mg
IM, IV: 4-10 mcg/kg q3-4h
Adult: 0.2 mg
▮ Administer solution on empty stomach</td><td>PO
IM
IV
SQ</td><td>Solution: 1 mg/5 mL (not generic)
Tablets: 1, 2 mg
Injection: 0.2 mg/mL
▮ Solution contains propylene glycol
▮ Extemporaneous recipes available
▮ Injection contains benzyl alcohol</td></tr>
<tr><td></td><td colspan="3">▮ Caution: Down's syndrome, spastic paralysis, or brain damage (increased sensitivity to toxic effects)
▮ Least likely to cross blood-brain barrier, therefore it causes less confusion and visual disturbances
▮ Paradoxical excitation may occur in infants and young children</td></tr>
<tr><td>hyoscyamine
(Levsin)

PO: no age restriction

IV: > 18 yoa</td><td>Infants - 2 yoa:
<table><tr><th>Weight (kg)</th><th>Dose (drops)</th><th>Max Daily (Drops)</th></tr><tr><td>5</td><td>5</td><td>30</td></tr><tr><td>7</td><td>6</td><td>36</td></tr><tr><td>10</td><td>8</td><td>48</td></tr></table>2 - 12 yoa: 0.0625-0.125 mg q4h prn
Max: 0.75 mg/day
>12 yoa: 0.125-0.25 mg q4h prn
Max: 1.5 mg/day</td><td>PO
SL</td><td>Elixir: 0.125 mg/5 mL
Solution (drops): 0.125 mg/mL
Tablets, ODT, SL: 0.125 mg (not generic)
Tablets: 0.125 mg
Injection: 0.5 mg/mL
▮ Oral liquids may contain sodium benzoate or ethanol
▮ ODT contains aspartame
▮ IV not approved in children</td></tr>
<tr><td></td><td colspan="3">▮ Maintain good oral hygiene</td></tr>
<tr><td>scopolamine
(Transderm Scōp)

>12 yoa</td><td>1 patch q3days
Adult: 1-3 patches
• Do not cut patches</td><td>TD</td><td>▮ Transdermal Patch: 1.5 mg (not generic)
▮ • Apply to hairless area behind ear</td></tr>
<tr><td></td><td colspan="3">▮ May be useful in post operative nausea & vomiting
▮ SE: sedation, constipation, confusion, visual disturbances
▮ Stronger anticholinergic effects than dimenhyDRINATE</td></tr>
</table>

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Cerebral Cortex Nausea- Anxiety: Anxiolytics			
hydrOXYzine (Atarax, Vistaril) >2 yoa	0.5-1mg/kg q6h **Adult:** 10-25 mg	**PO** **IM**	**Solution:** 10 mg/5 mL (Atarax), 25 mg/5 mL (Vistaril) **Tablets:** 10, 25, 50 mg **Capsules:** 25, 50, 100 mg **Injection:** 25, 50 mg/mL ▮ IM painful; IV not recommended ▮ Injection contains benzyl alcohol
	▮ Serious adverse reactions have been reported in <2 yoa (respiratory depression, seizure) ▮ SE: paradoxical excitation, sedation ▮ Atarax (hydrOXYzine HCL) and Vistaril (hydrOXYzine pamoate) are different forms of same active drug		
LORazepam (Ativan)	0.02-0.05 mg/kg q6h prn **Max:** 2 mg/dose **Adult:** 0.5-1 mg	**PO** **SL** **PR** **IV** **SQ**	**Solution:** 2 mg/mL **Tablets:** 0.5, 1, 2 mg **Injection:** 2, 4 mg/mL ▮ IV and oral solutions contain benzyl alcohol, polyethylene and propylene glycol ▮ Tablets can be crushed ▮ Extemporaneous recipes available ▮ IV: dilute with equal volume; IVP over 2-5 min ▮ IV form may be given rectally
	▮ Drug of choice ▮ Indirect anti-emetic effect; treats underlying anxiety that exacerbates nausea and vomiting ▮ Paradoxical reactions more common in children		
Cerebral Cortex Nausea- Increased Intracranial Pressure: Corticosteroids			
dexamethasone (Decadron)	10 mg/m2, then 5 mg/m2 q6h prn Alternate dosing prior to chemo 0.3 mg/kg **Max:** 20 mg/day **Adult:** 4 mg	**PO** **SL** **PR** **IM** **IV**	**Solution, Elixir:** 0.5 mg/5 mL (5% EtOH) **Solution, concentrate:** 0.5 mg/0.5 mL (30% EtOH) **Tablets:** 0.5, 0.75, 1, 1.5, 2, 4 mg **Injection:** 10, 25, 50 mg/mL ▮ Oral solutions and elixirs may contain alcohol, propylene glycol, and benzoic acid. Use IV formulation orally (10 mg/mL PF).
	▮ May have benefit in non-specific nausea & vomiting ▮ For short term use unless end of life; withdraw gradually after long-term therapy ▮ Minimal mineralocorticoid activity ▮ Give with food or milk to decrease GI disturbances ▮ Avoid giving later in the day due to insomnia ▮ SE: adrenal suppression, Cushing's syndrome, hyperglycemia, immunosuppression, growth suppression, GI bleed, insomnia, hypertension, myopathy, fluid retention, mood alterations		

**Use cautiously in patients outside of FDA and manufacturer recommended age parameters.*
*** Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

Excerpted from Hunt MO, Protus BM, Winters JP, Parker DC. Pediatric Palliative Care Consultant: Guidelines for Effective Management of Symptoms. Montgomery, Al: HospiScript; c2014. p. 181-192.

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Constipation

Constipation (MUSIC AND PLAY)

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Although constipation is a symptom primarily managed through pharmacological means, the stigma from a child's perspective can also play a role in ongoing treatment. By releasing the stigmas associated with bowel movements, or the lack thereof, there is a potential for increased efficacy in the treatment options being prescribed. Both play and expressive interventions can provide the opportunity to desensitize discussions related to bowel movements and can provide an outlet to avoid the cycle of anxiety that can form because of absent and/or painful defecation. A Child Life Specialist may approach this situation through the use of play to normalize the experience and open up the opportunity for discussion. By personifying a doll or another object, the child has the ability to express their concern or experience in a way that may feel less jarring for them. The practitioner may also provide the opportunity to utilize books and other normalizing strategies to release the stigma surrounding bowel movements, perhaps also providing education on why it is so imperative that the medical team be aware of when and how often the child is moving their bowels.

Music therapy has an incredible use for improving both the pain/discomfort associated with constipation as well as providing increased relaxation to assist with moving the bowels. Similarly to how a music therapist might approach generalized or acute pain, the music therapist would provide relaxation methods through the use of music to assist with decreasing the perception of pain while simultaneously relaxing the body. One common technique music therapists utilize is Progressive Muscle Relaxation through the use of music. Music is entrained with the person's natural body mechanisms, such as breathing, movement, heart rate if being monitored, and gradually altered through the tempo, method, and style of playing. Simultaneously, the clinician leads the individual through visualization of their body and systematically directs them to tighten and release muscles throughout the body. With a symptom such as constipation, this can be a very effective way to relax the body enough to both promote pain reduction and possible motility.

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Constipation: A child experiencing discomfort from constipation generally can use support from a Child Life Specialist for the plan of care to relieve them of this discomfort. Enemas specifically are often used as a first attempt to resolve constipation. While this procedure may not seem very worrisome to an adult, it may feel that way to a child. Child life services can help provide preparation and support for such a procedure to occur and promote distraction during the waiting period to aide in a better result.

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Massage therapy protocol to ease constipation (for use only when bowel obstruction has been ruled out)

It can be helpful to imagine, when doing this protocol, that the patient's intestines and colon are full of parked cars that need to be moved out one by one, starting with the one nearest the "exit" at the end of the descending colon. Your strokes/compressions will be slow and deliberate, working your way back along the intestinal tract as you go.

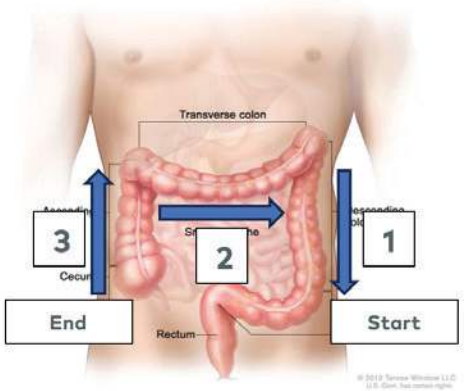
Starting on the left side of the patient's abdomen just a few inches superior to the left hip bone, apply gentle pressure, within the patient's tolerance, and gently push down and toward the patient's left foot, on about a 45-degree angle; gently release that pressure and move your hand up about 1 or 2 inches past where your first stroke began and repeat the same technique; gently release that pressure and scoot your hand back to just below the patient's lowest anterior rib and repeat the pressure and angle of the previous strokes.

Now, turn your hand so it is perpendicular to the patient's body with your fingertips pointing in the direction of the patient's left arm and work your way across the abdomen in the same step-by-step fashion, applying a sinking compression with your fingertips at 1-2inch intervals.

When you reach the "corner" of the transverse colon, where it becomes the ascending colon (by now, you have probably--depending on the size of the patient--completed 5 or 6 total strokes), turn your hands again, but this time your fingertips should be pointing toward the patient's head and your compressions should go in that direction also, ostensibly "pushing the stool" toward the space you have just created with your earlier strokes. Apply another sinking compression at a 45-degree angle toward the patient's head; release the pressure and scoot your hand back another 1-2 inches, toward the right hip bone, and sink again; repeat this until you are just an inch or so superior to the right hip bone.

Repeat up to 10 times beginning just superior to the left hip bone each time, depending on patient comfort and the impact of the protocol on the patient's bowels. Essentially, you are moving the bowels along the intestine a bit at a time.

When you reach the place where the transverse colon becomes the ascending colon, below the ribs on the right side of the abdomen, you will orient yourself, so your strokes are going toward the patient's head as you work your way down the ascending colon, in small segments toward the cecum.



Start at the descending colon. Make a short compression, pushing toward the patient's foot at a 45-degree angle. Release the pressure and move up 1-2 inches toward the ribs and compress again. Repeat that process until you are just inferior to the ribs. Then work your way across the transverse colon in the same manner.

Constipation

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Introduction and Background[1-3]

- Constipation can be defined as the slow movement of fecal matter through the large intestine.
- This delayed elimination results in painful passage of dry, hard stools.
- Bowel movements will be less frequent, as little as weekly, in patients with minimal solid intake.
- Stools are not common during the natural dying process.
- Form and frequency of stools varies depending on child's age and type of feedings received (Table 1). Normal stool frequency can vary in children from three times per day to once every three days. Frequency can be extended to once every two weeks in breast fed infants.[6]

Table 1. Stool Frequency Based on Age4-5

Age	Range of stools/day	Average stools/day
0-3 months		
▮ Breast-fed	1-6	2.9
▮ Formula-fed	1-4	2
6-12 months	1-4	1.8
1-3 years	0-3	1.4
>3 years	0-2	1

Causes[1,6-11]

- Causes of constipation may be multifactorial (Table 2). In infants, dehydration and neurologic disorders are the most common causes.
- The gastrointestinal (GI) tract is a neurologic organ. Therefore, bowel motility issues are common in patients with neurologic disease.

Table 2. Possible Causes of Constipation

Causes	Examples
Behavioral	Inactivity due to illness or treatment, fear of stool passage due to pain or "functional withholding"
Dehydration	Decreased fluid, food intake, or abnormal feeding patterns
Diseases	Celiac disease, cystic fibrosis, Hirschsprung disease, inflammatory bowel disease, muscular dystrophy, systemic lupus erythematosus
Medications	5HT3 antagonists, anticholinergics, anticonvulsants, benzodiazepines, chemotherapy, H2 receptor antagonists, iron, nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, phenothiazines, proton pump inhibitors (PPIs), tricyclic antidepressants (TCAs)
Metabolic	Hypercalcemia, hypokalemia, hypothyroidism
Neurologic	Damage to nerve pathways and musculature secondary to neurodegenerative disease
Tumors	Intra-abdominal tumors (direct compression on the gut or spinal cord)

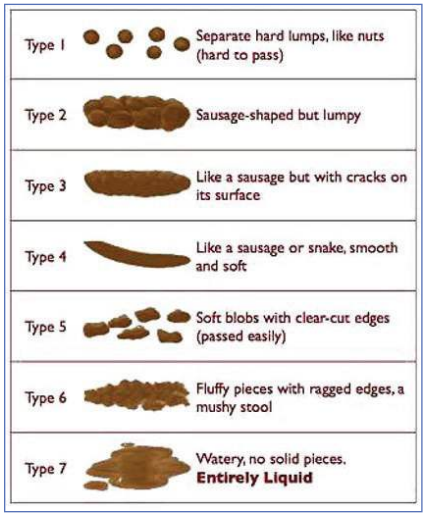
Clinical Characteristics[7-8]

- Difficulty passing stools is one of the first signs of constipation in children.
- Constipation commonly presents with abdominal pain, bloating, flatulence, anorexia, nausea, vomiting, and fecal impaction.
- Patients with impactions may present with diarrheal leakage around the hardened stool, known as overflow incontinence.

Assessment[4-6, 9, 12-13]

- Consider developmental level during assessment; children, especially adolescents, may be embarrassed when describing bowel habits and may not give an accurate history.
- The Bristol Stool Scale (Figure 1) has been used to classify human feces.[14] Types 1-2 indicate constipation, while types 3 and 4 are ideal, and 5-7 indicate diarrhea.

Figure 1. Bristol Stool Scale[14]



- **Bowel habits**
  - Usual, current, last bowel movement
  - Changes in consistency, color, size, odor
  - Type (Figure 1), texture, size
  - Presence of blood, odor, pain
- **Dietary habits and fluid intake**
  - Constipating foods, such as dairy
  - Fiber content
- **Mobility**
- **Metabolic abnormalities**
- **Medication history**
  - Contributing medications
  - Successful or unsuccessful therapies tried
- **Physical exam**
  - Bowel sounds
  - Abdominal palpation
  - External examination
    - Hemorrhoids or fissures
  - Rectal examination
    - Weigh risks versus benefits in neutropenic patients

Non-Pharmacological Treatment[2-6, 11, 14]

- The establishment of a regular bowel routine should be supported by providing access to a toilet with privacy, especially after meals.
- Encourage increased activity when appropriate. This can be facilitated with physical therapy or a child life specialist when appropriate.
- Increase fluid intake of the child's favorite drinks. (Children less than six months of age should not be given free water or fruit juices.)
- Increase dietary fiber from sources such as:
  - Whole-grain cereals
  - Fruits like apples, apricots, dates, figs, peaches, pears, plums, prunes, or raisins
  - Vegetables such as beans, broccoli, cabbage, carrots, cauliflower, celery, or peas
  - Fruit juices like apple, pear, or prune juice
  - Power pudding: blend 1 cup prune juice, 1 cup bran cereal, and 1 cup applesauce; administer 1-2 tablespoons daily and titrate as needed; refrigerate up to one week.[16]
  - Fruit paste: Boil 1 lb prunes, 1 lb raisins, 1 lb figs, and 16 oz brewed senna tea for 5 minutes, then add 1 cup brown sugar and 1 cup lemon juice and mix to form paste; freeze and serve 1-3 teaspoons daily and titrate as needed.[12]
- Consider abdominal massage in a clockwise fashion. Warm hands placed on the stomach tend to increase abdominal relaxation.
- Self-hypnosis, biofeedback, and cognitive-behavioral therapy may be effective, especially in children with neurogenic bowel.
- In infants, rectal stimulation may be successful. Dietary changes, such as a small amount of fruit juice, may be adequate.

Pharmacotherapy[4-5, 12]

- The goal of pharmacotherapy should be focused on preventing constipation, where possible, and treating patients who have already become constipated to avoid impact on quality of life.

- Stimulant laxatives may be necessary in children >2 years of age receiving opioids to prevent constipation.
- Daily maintenance therapy for pediatric patients should be initiated with an osmotic laxative, such as polyethylene glycol (PEG, Miralax®). Ensure adequate fluid intake for maximum benefit and safety. PEG is considered the first-line osmotic therapy, as it has been reported superior to other osmotic agents in palatability and acceptance by children, but requires administration with 4-8 ounces of liquid.17-25
- Second-line osmotic agents, magnesium hydroxide, lactulose, and sorbitol, seem to be equally efficacious; therefore, choice is based on safety, cost, the child's preference, ease of administration, and the practitioner's experience. Although, if PEG is ineffective, a stimulant is often used, rather than trying another osmotic agent.
- Osmotic laxatives may not be beneficial in patients with neuromuscular conditions or opioid-induced constipation. In these cases stimulant laxatives may be necessary. Senna is considered first-line stimulant due to the risk of cramping with bisacodyl.
- In the patient with chronic illness, stimulant laxatives may be necessary intermittently. However, prolonged use of these agents may lead to dependency, fluid and electrolyte imbalances, or vitamin and mineral deficiencies. In hospice, senna (+/- docusate) is the preferred agent for opioid-induced constipation.
- Stimulants and enemas should be avoided in infants. Glycerin suppositories and dietary changes should be first line in infants.
- Suppositories and enemas should be used with caution in neutropenic or thrombocytopenic patients.
- Certain enemas may be toxic to children. Phosphate enemas may lead to hyperphosphatemia. Soapsuds enemas can lead to perforation and bowel necrosis. Tap water enemas can cause hyponatremia.
- Fecal disimpaction may be necessary before initiating maintenance therapy for constipation.
  - Rectal stimulation may be adequate for disimpaction, especially in infants or patients with neurologic deficit.
  - Glycerin suppositories in infants and bisacodyl suppositories in older children have shown efficacy for rectal disimpaction. Suppositories help to soften and lubricate the fecal mass and allow for easier evacuation.
  - If suppositories are inadequate, rectal disimpaction may be performed with phosphate soda enemas, saline enemas, or mineral oil enemas followed by a phosphate enema.
  - PEG has been successful for oral disimpaction. Oral mineral oil should be avoided due to risk of aspiration.
  - High-dose magnesium hydroxide, magnesium citrate, lactulose, sorbitol, senna, and bisacodyl have also shown success in oral disimpaction.

Clinical Pearls

- Patients receiving more than one opioid dose per day should have corresponding orders for medications to prevent opioid-induced constipation.
  - An osmotic laxative or stool softener should be scheduled and, if ineffective, a stimulant should be added. While osmotic laxatives may be adequate in healthy children, hospice patients often require a stimulant laxative.
  - Stool softeners provide the "mush," but without the "push" of a stimulant the "mush" may not leave the colon.
- For high impactions, give 2-3 "Vaseline Balls" orally instead of liquid mineral oil.
  - "Vaseline Balls" are pea sized frozen balls of white petrolatum rolled in powder sugar or powered hot chocolate mix.
- In infants, sweet syrup can be made using 2 tablespoons of brown sugar in 4 oz warm water. Dry brown sugar is less likely to contain organisms that might be found in a concentrated sugar liquid.
- While PEG has a multitude of safety and efficacy data in children, it can be difficult to find the appropriate dose. Patients may complain of a "seesaw" effect, where the dose is either supratherapeutic or subtherapeutic and then the opposite after dosage adjustment. It's availability over the counter may allow easy accessibility, but limit coverage by third party payers.
- Laxatives are contraindicated in patients with complete bowel obstruction. Softening the stool may be acceptable in cases of partial obstruction.
- Minimal benefit has been shown with probiotics, therefore, probiotics are not indicated for constipation.[14] Prebiotics, such as inulin, fructo-oligosaccharides, and galacto-oligosaccharides resist digestion until the colon and improved stool frequency in infants and young children.

Table 3. Pharmacological Management of Constipation[26]

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Chemoreceptor Trigger Zone Nausea			
docusate (Colace)	**PO:** 5 mg/kg/day divided q6h-q24h **<3 yoa:** 10-40 mg/day divided q6h-q24h **3-6 yoa:** 20-60 mg/day divided q6h-q24h **6-12 yoa:** 40-150 mg/day divided q6-24h **>12 yoa:** 50-400 mg/day divided q6-24h **PR:** >12 yoa: add 50-100 mg of docusate liquid (not syrup) to NS or water	**PO** **PR**	**Liquid:** 50 mg/5 mL **Syrup:** 20 mg/5 mL **Capsule:** 50, 100, 240, 250 mg **Solution, enema:** 283 mg/5 mL (no generic) ▮ Enemeez Plus contains benzocaine ▮ Administer liquid with milk, fruit juice, or infant formula to mask bitter taste
	▮ Option for patients who should avoid straining during defecation ▮ Must be used with adequate fluid intake to maximize benefit and safety ▮ Avoid using with mineral oil ▮ SE: abdominal cramping, nausea, diarrhea, intestinal obstruction		
glycerin	**<6 yoa:** 1 infant suppository bid prn OR 2-5 mL of rectal solution as an enema **>6 yoa:** 1 adult suppository bid prn OR 5-15 mL of rectal solution as an enema	**PR**	**Suppository:** 1, 1.5, 2 g, 82.5% **Solution, PR:** 2.3 g/2.3 mL, 5.6 g/5.5 mL (no generic) ▮ A suppository tip or chip can be used ▮ Retain in rectum for 15 minutes
	▮ Penetrates and softens stools ▮ Promotes bilirubin excretion by reducing enterohepatic circulation in newborns ▮ Can stimulate passage of meconium ▮ SE: abdominal pain, rectal irritation		
Stimulant Laxatives			
bisacodyl (Dulcolax) >6 yoa	**PO:** 3-12 yoa: 5-10 mg or 0.3 mg/kg q24h **>12 yoa:** 5-15 mg/day, Max: 30 mg **PR:** <2 yoa: 5 mg/day27 **2-11 yoa:** 5-10 mg/day **>12 yoa:** 10 mg/day	**PO** **PR**	**Tablet:** 5, 10 mg **Tablets, EC, DR:** 5 mg **Suppository:** 10 mg **Solution, enema:** 10 mg/30 mL (no generic) ▮ Do not crush or chew EC tablets
	▮ Oral dosing limited by severe cramping; Administer on an empty stomach ▮ PR bisacodyl considered first line in NPO patient ▮ Do not administer within 1 hour of ingesting antacids, alkaline material, or dairy products ▮ SE: abdominal pain, nausea, cramping		
docusate and senna (Senokot-S) > 2 yoa	**2-6 yoa:** ½ tab qhs, Max: 1 tab BID **6-12 yoa:** 1 tab qhs, Max: 2 tabs BID **>12 yoa:** 2 tabs qhs, Max: 4 tabs BID	**PO**	**Tablet:** 50 mg docusate sodium and 8.6 mg sennosides
	▮ Administer with water, preferably in the evening ▮ SE (usually mild): abdominal cramping, nausea, vomiting, diarrhea, urine discoloration (red/brown)		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
senna (Senokot) Tablet > 2 yoa	**1 mon-2 yoa:** 2.2-4.4 mg sennosides (1.25-2.5 mL) qhs, Max: 5 mL/day **2-6 yoa:** 4.4-6.6 mg sennosides (2.5-3.75 mL, ½ tab) qhs, Max: 3.75 mL or 1 tab BID **6-11 yoa:** 8.8-13.2 mg sennosides (5-7.5 mL, 1 tab) qhs, Max: 7.5 mL or 2 tabs BID **>12 yoa:** 17.6-26.4 mg sennosides (10-15 mL, 2 tabs) qhs, Max: 15 mL or 4 tabs BID	PO PR	**Syrup:** 8.8 mg/5 mL **Liquid, concentrate:** 33.3 mg/mL **Drops:** 8.8 mg/mL **Strips, ODT:** 8.6 mg **Tablet, chewable:** 10, 15 mg **Tablet:** 8.6, 15, 25 mg ▮ Liquid products may contain propylene glycol or sodium benzoate
	▮ Preferred for opioid-induced constipation ▮ Drink plenty of fluids; Syrup can be taken with juice, milk, or mixed with ice cream to mask taste ▮ SE (mild): abdominal pain, nausea, vomiting, diarrhea, may discolor urine (red/brown) or feces		
Osmotic Laxatives			
lactulose (Generlac)	**<18 yoa:** 0.7-2 g/kg/day (1-3 mL/kg/day) in divided doses **Adult:** 10-20 g (15-30 mL) qday **Max:** 40 g/day (60 mL/day)	PO	**Solution, PO, PR:** 10 g/15 mL **Crystals for solution, PO:** 10 g/packet, 20 g/packet (not generic) ▮ To administer as a retention enema, mix with H2O or NS and use a rectal balloon catheter – retain for 30-60 min
	▮ Contraindicated if on galactose-restricted diet ▮ Infants may develop hyponatremia and dehydration ▮ SE: abdominal pain, bloating, nausea, diarrhea		
magnesium citrate (Citroma)	**<6 yoa:** 2-4 mL/kg **6-12 yoa:** 100-150 mL **>12 yoa:** 150-300 mL ▮ Dosed daily or in divided doses	PO	**Solution:** 290 mg/5 mL ▮ Mix solution with a full glass of H2O and administer on an empty stomach
	▮ Monitor magnesium levels in patients with a CrCl <25 mL/min ▮ SE: abdominal cramps, diarrhea, gas, hypermagnesemia, hypotension, or respiratory depression		
magnesium hydroxide (Milk of Magnesia) Tablet: > 2 yoa	**<2 yoa:** 0.5 mL/kg/dose **2-5 yoa:** 311-622 mg (5-15 mL, 1-2 tabs) **6-11 yoa:** 933-1244 mg (15-30 mL, 3-4 tabs) **>12 yoa:** 1866-2488 mg (30-60 mL, 6-8 tabs) ▮ Dosed qhs or in divided doses ▮ Based on 400 mg/5 mL conc	PO	**Suspension:** 400 mg/5 mL **Suspension, concentrate:** 800 mg/5 mL **Tablet, chewable:** 311, 400 mg (not generic) ▮ Mix oral solution with full glass of H2O and administer on an empty stomach ▮ Administer tablet with a full glass of H2O
	▮ Repeated use may be appropriate ▮ Monitor magnesium levels in patients with a CrCl <25 mL/min ▮ Not used often in very ill children because of strong purgative action ▮ SE: abdominal pain, diarrhea, nausea, vomiting, ↑ magnesium, hypotension, respiratory depression		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
polyethylene glycol 3350 (MiraLAX) > 17 yoa	**>6 mon:** 0.5-1.5 g/kg/day, NTE 17 g/day **Adult:** 17 g (~1 heaping tbsp) qday ▮ Difficult to establish patient dose	**PO**	**Powder for solution:** 17 g/dose, 17 g/packet ▮ Dose can be measured using bottle cap and added to 4-8 ounces of beverage ▮ For ease of measuring: 1 tsp= ~5.5 g
	▮ Serious adverse reactions have been reported in <2 yoa (respiratory depression, seizures) ▮ SE: paradoxical excitation, constipation, sedation		
sodium phosphates (Fleet Enema) >2 yoa3	**PO:** 5-9 yoa: 7.5 mL qday **10-11 yoa:** 15 mL qday **>12 yoa:** 15-45 mL qday **PR:** 2-4 yoa: 1/2 of a 2.25 oz pediatric enema qday **5-11 yoa:** 2.25 oz enema qday **>12 yoa:** 4.5 oz enema qday	**PO** **PR**	**Solution:** sodium phosphate monohydrate 2.4 g, heptahydrate 0.9 g/5 mL **Solution, enema:** sodium phosphate monohydrate 19 g, hetahydrate 7 g/118 mL ▮ Dilute oral solution in 8 ounces of cool water, follow with 8 more ounces of water ▮ Avoid retention of enema solution
	▮ Short-term treatment of constipation ▮ Maintain adequate fluid intake ▮ Avoid oxalate (berry, nut, chocolate, bean, tomato) or phytate-containing foods (bran, wheat) ▮ SE: abdominal discomfort, nausea, vomiting, diarrhea, mucosal bleeding, hypernatremia, hyperphosphatemia, dizziness, headache		
sorbitol > 2 yoa	**PO:** 2-11 yoa: 2 mL/kg **>12 yoa:** 30-150 mL **PR:** 2-11 yoa: 30-60 mL (25-30%) **>12 yoa:** 120 mL (25-30%)	**PO** **PR**	**Solution, PO, PR:** 70% ▮ Use 25%- 30% solution for PR: Dilute 1 part solution with 2.3 parts water
	▮ •Single dose at infrequent intervals; Rarely used ▮ •Contraindication: anuria ▮ •SE: abdominal pain, nausea, vomiting, diarrhea, dry mouth (xerostomia)		
Prokinetic Agents			
Erythromycin (E-Mycin)	2.5 mg/kg q6h **Adult:** 125-250 mg ▮ Administer before meals and qhs	**PO**	**Suspension:** 200 mg/5 mL **Capsules, Tablets:** 250 mg ▮ Chewable tablets should not be swallowed whole ▮ Delayed release and enteric coated tablets should not be broken or chewed ▮ Avoid IV administration, associated with fatal complications, contains benzyl alcohol
	▮ Rarely used for constipation, unless underlying motility disorder ▮ Consider if patient cannot tolerate metoclopramide (due to EPS)		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
metoclopramide (Reglan)	0.1-0.2 mg/kg q 6h **Adult:** 10 mg ▮ May dose up to 1 mg/kg for dopamine antagonism or chemotherapy induced nausea/vomiting ▮ Administer 30 min before meals and at bedtime	**PO** **PR** **IM** **IV**	**Solution:** 5 mg/5 mL **Tablets:** 5, 10 mg **Tablets, ODT:** 5, 10 mg (no generic) **Injection:** 5 mg/mL ▮ Some products contain sodium benzoate
	▮ Rarely used for constipation, unless underlying motility disorder ▮ Extrapyramidal symptoms (EPS) occur more frequently in children. May administer diphenhydrAMINE for EPS prevention. Concurrent administration with anticholinergic agents (e.g. diphenhydrAMINE) will decrease prokinetic effect, but not anti-emetic effect. ▮ Black box warning: irreversible tardive dyskinesia ▮ Contraindication: complete bowel obstruction ▮ SE: sedation, confusion		

**Use cautiously in patients outside of FDA & manufacturer recommended age parameters. **Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

Excerpted from Hunt MO, Protus BM, Winters JP, Parker DC. Pediatric Palliative Care Consultant: Guidelines for Effective Management of Symptoms. Montgomery, Al: HospiScript; c2014. p. 67-75.

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Anxiety/Agitation/Delirium

Anxiety/Agitation (MUSIC AND PLAY)

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Another symptom at the forefront of palliative and hospice care is the presence of anxiety and agitation. Although there are several methods of pharmacological intervention available to patients and families, a myriad of research has indicated the increased efficacy of the aforementioned when utilized in conjunction with music therapy intervention, as well as the involvement with child life. The primary goal of both music therapy and child life is to find a healthy way to process the symptoms of anxiety and identify the root cause.

Interventions such as music listening and lyric analysis can allow a music therapist to interpret symbolic statements to help better identify where the anxiety originates. Additionally, symptoms of anxiety can be lessened through use of relaxation techniques to promote feelings of calmness and grounding.

In child life, a child is given increased opportunities for control as they direct play sessions and participate in medical play interventions. This can lessen the experience of anxiety as they are able to gain mastery over the root cause of the anxiety, whether this been related to a procedure, a diagnosis, or an experience.

Anxiety/Agitation/Delirium

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- Music for relaxation: this includes using music guided by the patient's respiratory rate, using musical elements to match the patient's current state and modifying musical elements to shift to a more ideal mood state, utilizing a steady consistent tempo, and low arousal music.
- Music listening: singing live version of patient's familiar songs, CD recorded of appropriate music, family included in session.
- Imagery and music: using script that is relevant to a patient's needs or selected by patient by giving choices of themes, script is read supported with music playing softly.
- Improvisation: music is guided by the patient, a variety of instruments are selected depending on the patient's physical strengths, and patient given choices of instruments selected.
- Instrument playing: Involving family and patient can make choices of instruments for others in the room, music is guided by patient.
- Therapeutic song choices: Music is chosen by patient and family to provide autonomy and opportunity to contribute, patient-preferred music chosen by music therapist or patient can give patient sense of validation of feelings.
- A study by Millett and Gooding (2017) surveyed 40 pediatric patients and their caregivers on their anxiety levels pre- and post-surgery. The findings showed a significant reduction in anxiety for both patients and their caregivers. The music therapy interventions utilized included both passive and active interventions including music-assisted relaxation and active music making utilizing instrument playing and patient preferred music. There were no differences in scores between passive and active interventions.

Millett, C. R., & Gooding, L. F. (2017). Comparing active and passive distraction-based music therapy interventions on preoperative anxiety in pediatric patients and their caregivers. *Journal of music therapy*, 54(4), 460-478.

Delaney, A. M., Herbert, A. R., Bradford, N., & Bernard, A. (2023). Associations between music therapy, pain and heart rate for children receiving palliative care. *Music Therapy Perspectives*, 41(1), 75-83.

Edwards, J. (1999). Anxiety management in pediatric music therapy. In C. Dileo (Ed.), Music therapy and medicine: *Theoretical and clinical applications* (pp. 69–76). Silver Spring, MD: American Music Therapy Association.

Patient M was a 19-year-old female with other specified congenital malformations. M became more anxious when she experienced episodes of tachycardia and her heartrate would increase. The music therapist used a variety of music interventions, using both live and recorded music, to decrease anxiety. The music therapist would use verbal and musical cues throughout to encourage relaxed posture and deep breathing, leading to an increase in relaxation and a decrease in anxiety.

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Anxiety/Agitation/Delirium: As with other symptoms, child life services can be a support during anxiety/agitation/delirium. Support via distraction is especially relevant for the experience of anxiety. While such support on its own may not relieve a patient of this feeling, in combination with other interventions distraction can be extremely supportive. Child Life Specialists can also provide education regarding these three experiences and engage in developmentally-appropriate conversation to help a child understand what causes them.

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Agitation/Anxiety/Delirium: Children and teens experiencing a medical event will develop anxiety beforehand. A recent systematic review of medical procedure preparation effectiveness concluded that children and adolescents who were psychologically prepared for medical events by a CCLS experienced fewer immediate and long-term negative symptoms than did children who did not receive formal CCLS preparation. There was a significant decrease in post-procedural stress, fear, and anxiety, with increased cooperation during procedures, use of self-controlling coping mechanisms, and improved mental and physical adjustments towards future medical care. Research also evidenced that the use of medical play in preparatory and coping interventions, facilitated by a CCLS, decreased the need for sedation in diagnostic and minor-to-moderate procedures such as injections, MRI, and radiotherapy, thereby reducing the risks for the pediatric patient while being cost-effective, reducing usage of time, personnel, equipment, and related expenses.

Anxiety

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Introduction and Background[1-3]

- As defined by The Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), anxiety is a state of fearfulness, apprehension, worry, emotional discomfort, or uneasiness that either results from an unknown internal stimulus, is excessive, or is otherwise inappropriate to a given situation.[1]
- Anxiety is closely related to fear, but fear has an identified cause or source of worry (e.g. fear of death). Fear may be more responsive to counseling than an anxiety state that the patient cannot attribute to a particular fearful stimulus.
- A child's anxiety is based on prior experience and understanding.
- Pediatric patients often have difficulty distinguishing between symptoms of anxiety and physically-manifested symptoms.

Causes[2]

- Many medical conditions can precipitate anxiety in ill patients (Table 1).
- Certain time intervals during an illness may illicit strong psychological reactions:
  - Initial diagnosis of a life-threatening illness
  - Initial treatment
  - Subsequent treatments
  - Hospitalization
  - Any disruption in normal routine
  - Periods of relapse
  - End-of-life care initiation

Table 1. Potential Causes of Anxiety[2]

Category	Conditions
Cardiovascular	Hematologic (e.g., anemia), tachycardia, ischemic heart disease, arrhythmias, congestive heart failure
Endocrinology	Thyroid dysfunction, adrenal insufficiency, Cushing syndrome, hypopituitarism, pheochromocytoma
Gastrointestinal	Constipation, anal tears, obstruction
Medications	Caffeine, antiemetics, cholinergics, substance abuse or withdrawal
Metabolic	Electrolyte disturbances (Na, Ca), uremia, vitamin B12 or folate deficiency
Musculoskeletal	Body disfigurement
Neoplasms	Brain tumors, leukemia, lymphoma, small cell carcinoma, pancreatic cancer
Neurologic	Concussion, encephalopathy, mass, seizure, stroke, vertigo
Other	Delirium, infection, transplantation
Pain	Fear of pain, procedural, surprising pain, uncontrolled
Psychosocial	Changes in self-image or body image, parental fears, secrecy
Pulmonary	Dyspnea, anaphylaxis, asthma, hypoxia, pneumothorax, pulmonary edema, pulmonary embolism

Clinical Characteristics[2, 4-5]

- Symptoms of anxiety can range from a general uneasiness or discomfort to paralyzing fear that incapacitates the child. Only one key symptom is required for a diagnosis of anxiety, compared to three symptoms in adults (Table 2).
- Physical, behavioral, and cognitive symptoms often accompany anxiety in pediatric patients (Table 3).

Table 2. Anxiety Disorders Seen in Medically Fragile Children[1-2]

Diagnosis	Key Symptoms and Considerations
Acute stress/ post-traumatic stress disorder	Numbness, intrusiveness, and hyperarousal; duration greater than one month; can occur as a reaction to hearing diagnosis, aspects of medical treatment, or memories of treatment; common in chronic physical illness
Anxiety disorder caused by general medical condition	Consequence of another medical condition; consider if history not consistent with symptoms of primary anxiety disorder and/or is resistant to treatment; may include physical symptoms (e.g., tachycardia, shortness of breath, tremor)
Generalized anxiety disorder	Excessive worry, that is difficult to control, with associated restlessness, fatigue, difficulty concentration, irritability, muscle tension, or sleep disturbance
Obsessive-compulsive disorder	Obsessive or compulsive predominance possible; obsessive preoccupation or fears about physical illness; compulsive behaviors (e.g., hand washing for infection prevention)
Panic disorder	Recurrent, unexpected panic attacks; persistent worry about possibility of having more panic attacks; Severe palpitations, diaphoresis, and nausea; feelings of impending doom
Phobias	Fearful, anxious about, or avoid of specific objects or situations (e.g., blood, needles, claustrophobia, agrophobia, white coat syndrome)
Separation anxiety disorder	Inappropriate and/or excessive worry about separation from home and/or family; common in children younger than age 6, resurgence around age 12; may be exacerbated by hospitalizations
Substance-induced anxiety disorder	Results from direct effect of substance or withdrawal; Review medication history, including medication changes

Table 3. Accompanying Anxiety Symptoms in Children[2]

Symptoms	Examples
Physical	Sleep disturbance, shortness of breath, nausea
Behavioral	Rushed speech, irritability
Cognitive	Helplessness, dread

- Anxiety in pediatric patients may be acute or chronic in nature, may be a primary disorder, a secondary disorder, a psychological reaction to illness, or may present as a comorbid psychiatric disorder, such as anxiety with depression.
- Preschool children do not realize the permanence of death and are typically most concerned with parental separation or physical pain; school age children understand that death is permanent and are most upset about being different than their peers; and adolescents have a more adult view of the irreversibility of death and are concerned about loss of control and independence.

Assessment[2,4,6-7]

- Since pediatric patients may not be able to distinguish between physical symptoms and anxiety, a thorough age-appropriate evaluation of the differential diagnosis is necessary.
- Symptoms of anxiety and depressed mood tend to overlap and should be evaluated regularly.
- Cultural consideration must be a component of interdisciplinary assessment, since symptoms, experiences, and beliefs will influence assessment and intervention.
- Assessment should include evaluation of medical conditions that may cause, mimic, or exacerbate anxiety such as:
  - Delirium, particularly in the early stages, can be confused with anxiety
  - Physical complications of illness, especially dyspnea, undertreated pain, constipation, or sleep deprivation
  - Periods of oxygen desaturation in patients with advanced lung disease
  - Medication side effects, especially akathisia from older antipsychotics and antiemetics (including metoclopramide)
  - Interpersonal, spiritual, or existential concerns
- Core symptoms of anxiety might present differently in children, requiring special assessment strategies. A multitude of anxiety assessment scales are available for use in pediatric patients; a sample of these scales is included in Table 4.

Table 4. Anxiety Assessment Tools[4]

Assessment Scale	Ages	Comments
Child Behavior Checklist (CBCL)**, Youth Self Report** (YSR)**, Teacher Report Form** (TRF)†	4-18 yoa	118-120 items; Symptoms scored over previous 6 months; Parent, teacher & child-rated
Pediatric Anxiety Rating Scale (PARS)†	6-17 yoa	50 items classified into five subtypes; Parent, child & clinician-rated; Commonly used in studies
Revised Children's Anxiety and Depression Scale (RCADS)†	6-19 yoa	47 items; Child and parent versions available in several languages
Fear Survey Schedule for Children- Revised (FSSC-R)†	7-18 yoa	80 items; Self-rated amount of fear elicited by each situation
Screen for Child Anxiety Related Emotional Disorders (SCARED)*†	>8 yoa	41 items classified into five subtypes; 5-item version available

**indicates commonly used scales; † indicates free and easy to access scales*

Non-Pharmacological Treatment[6-10]

- Non-pharmacological and age-appropriate therapies should be first line in children.
- Prevent anxiety when possible, especially from procedures
  - Use a calm and reassuring approach
  - Avoid painful procedures when possible
  - Explain when events will cause pain
  - Offer child life therapy and distraction during procedures
  - Provide anesthesia, including topical or numbing agents, during procedures
  - Recognize and acknowledge potential pain
- Reduce environmental stimuli based on patient preference
  - Teenagers may be more comfortable with a louder environment
- Minimize disruptions in the child's daily routine when possible
- Establish a safe, soothing environment
  - Familiar staff, family, objects, bedding, toys, photographs, aromas, and music (drumming)
  - Minimal noise
  - Adequate lighting
- Cognitive behavioral therapy
- Art, pet, aroma, music, and play therapy
- Massage therapy, yoga, and relaxation exercises
- Swaddling and Kangaroo care for infants or fabric for children
- Imagery for biofeedback for children older than 3 years of age
- Promote open communication with patient, family, and healthcare team
  - Allow child opportunity to ask questions regarding illness
  - Address secret keeping; often the child is aware of the severity of their illness
- Offer existential/emotional support consistent with the patient and family's cultural and spiritual beliefs and needs
- Educate patients and families about anxiety itself and its treatments

Pharmacotherapy [5,7-8,11]

- Measures should be taken to prevent anxiety when feasible. Possible contributing factors should be evaluated and corrected when possible, such as pain.
- Non-pharmacological therapies should be first-line in children and continued throughout treatment.
- Benzodiazepines are the treatment of choice for acute anxiety in pediatric patients. These agents should be started on an as needed basis for approximately 24 hours and need for scheduled therapy evaluated on an ongoing basis.
- Other potential options include haloperidol or chlorproMAZINE.
- Antidepressants, such as Selective Serotonin Reuptake Inhibitors (SSRIs), should be used in chronic anxiety. However, antidepressants require 2-6 weeks to see full benefit. In general, antidepressant doses should not be adjusted more frequently than every two weeks.
- Benzodiazepines can be started for acute benefit during the first two weeks of SSRI therapy or while environmental changes or counseling are provided.
- Unless at end of life, benzodiazepines should not be considered chronic therapy and attempts should be made to transition to other chronic therapies.
- In most situations, the combination of cognitive behavioral therapy, child life therapies, and pharmacological agents is more effective than each alone.
- Assess treatment response and side effects frequently (at least every two weeks).
- Anxiety should be identified and treated early, focusing on its effect on the patient's quality of life.
- Aim to prevent anxiety, rather than simply treating as needed when symptoms arise.

- Children greater than 10 years of age, and possibly younger, are generally aware of their prognosis, even if they have not been told. Therefore, children should be openly told, in understandable terms, about their condition in order to reduce anxiety. Children should be given the opportunity to ask questions. [5,8,17]
- Relief from anxiety should not require sedation.
- Children often eliminate psychotropic drugs more rapidly than adults and require more frequent dosing.

Table 5. Pharmacological Management of Anxiety[12]

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Benzodiazepines			
ALPRAZolam (Xanax) ≥ 18 yoa	**7-16 yoa:** 0.005 mg/kg or 0.125 mg/dose tid **Max:** 0.02 mg/kg/dose or 0.06 mg/kg/day **>16 yoa:** 0.25-0.5 mg tid **Max:** 4 mg/day in divided doses	**PO** **SL** **PR**	**Solution:** 1 mg/mL (no generic) **Tablets:** 0.25, 0.5, 1, 2 mg ▮ Solution contains propylene glycol
	▮ Increased risk of withdrawal symptoms, including seizures, after abrupt discontinuation ▮ Short half-life; high addiction potential		
clonazePAM (KlonoPIN)	**0.01 mg/kg q12h** **Max:** 0.1-0.2 mg/kg/day **Adult:** 0.25 mg bid **Max:** 4 mg/day	**PO** **SL/buccal** **PR**	**Suspension:** 0.1 mg/mL **Tablets, ODT:** 0.125, 0.25, 0.5, 1, 2 mg **Tablets:** 0.5, 1, 2 mg ▮ Tabs may be crushed for SL or PR
	▮ Not FDA approved for anxiety in children ▮ Long duration of action; active metabolites may accumulate; avoid abrupt discontinuation ▮ Caution: chronic respiratory disease, hepatic, or renal dysfunction ▮ SE (↑): drooling, sedation, cognitive effects, increased risk of suicidal behavior and ideation		
diazepam (Valium) PO: >6 months IM/IV: >30 days	**PO:** 0.12-0.8 mg/kg/day divided q6-8h **IM, IV:** 0.04-0.3 mg/kg q2-4h prn **Max:** 0.6 mg/kg within an 8-hour period **Adult:** PO: 2-10 mg bid-qid **IM, IV:** 2-10 mg may repeat q3-4h prn	**PO** **SL/buccal** **PR** **IM (poor)** **IV**	**Solution:** 5 mg/5 mL, 5 mg/mL **Tablets:** 2, 5, 10 mg **Injection:** 5 mg/mL **Gel, Rectal:** 2.5, 10, 20 mg ▮ Dilute injection; rate NTE 2 mg/min. Rapid IV push: apnea. Avoid IM: tissue necrosis. IV contains benzyl alcohol. ▮ Rectal gel usually used for seizures
	▮ Long half-life, but short duration due to rapid redistribution into peripheral tissues ▮ Active metabolite can accumulate, especially in patients with renal insufficiency ▮ Well absorbed PR (using tablets or injection) & SL (crushed tablets) ▮ Rectal formulation typically used for seizures ▮ Pediatric population more sensitive to SE		
LORazepam (Ativan)	**0.05 mg/kg q4-8h** *(acute situations may need more frequent dosing)* **Max:** 2 mg; 0.5 mg starting dose **Adult:** 0.25-10 mg/day in 2-3 divided doses	**PO** **SL** **PR** **IM** **SQ** **IV**	**Solution:** 2 mg/mL **Tablets:** 0.5, 1, 2 mg **Injection:** 2, 4 mg/mL ▮ Solutions (IV & PO) contain benzyl alcohol, polyethylene & propylene glycol ▮ IV: dilute 1:1; IVP over 2-5 min
	▮ Children are more susceptible to the therapeutic effects ▮ Slower onset, but longer duration in the CNS; no active metabolites ▮ Well absorbed PR (using tablets or injection) & SL (crushed tablets)		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
midazolam (Versed) >6 months	**PO/PR:** 0.2-0.5 mg/kg **Intranasal:** 0.2 mg/kg **IV:** 0.05 mg/kg; IM: 0.1-0.15 mg/kg **Max:** 10 mg; IM: 6 mg **Continuous IV:** 0.06-0.12 mg/kg/hr ▮ Sedation dosing; no specific anxiety dosing ▮ Dose based on ideal body weight in obese	**PO** **SL/Buccal** **Intranasal** **IV** **SQ** **IM**	**Syrup:** 2 mg/mL **Injection:** 1, 5 mg/mL ▮ Injection may be given buccally ▮ Oromucosal as effective as IV or PR diazepam ▮ Divide IN between nares ▮ Do not administer by rapid IV in neonates
	▮ Short duration of action ▮ Boxed Warning: risk of respiratory depression ▮ Infants <6 months at higher risk for airway obstruction and hypoventilation		
Typical Antipsychotic Agents			
chlorproMAZINE (Thorazine) >6 months	**0.5-1 mg/kg q4-6h prn** **Max:** <5 yoa: 40 mg/day; 5-12 yoa: 75 mg/day **Adult:** 10-50 mg/day divided q4-6h ▮ More frequent dosing orally	**PO** **SL** **PR** **IM** **IV**	**Tablets:** 10, 25, 50, 100, 200 mg **Injection:** 25 mg/mL ▮ Tablets contain benzoic acid ▮ For direct IV injection, dilute with NS to max concentration: 1 mg/mL & infuse at rate NTE 0.5 mg/minute ▮ Do not administer SQ (tissue damage)
	▮ Caution: cardiovascular, renal, or hepatic disease, chronic respiratory disease, seizures ▮ SE: EPS (common in pediatrics), sedation, lowers seizure threshold		
haloperidol (Haldol) >3 yoa IV: >18 yoa	**3-12 yoa:** 0.25-0.5 mg divided q8-12h **Max:** 0.15 mg/kg/day **Adult:** 0.5-1 mg q8-12h **IM (Lactate):** 2-5 mg q4-8h PRN ▮ Doses >6 mg/day have not been shown to further enhance behavior improvement ▮ If IM, switch to PO as soon as possible	**PO** **SL** **PR** **IM**	**Solution:** 2 mg/mL **Tablets:** 0.5, 1, 2, 5, 10, 20 mg **Injection (lactate):** 5 mg/mL ▮ Avoid contact with oral solution and skin ▮ Dilute oral liquid in water or acidic beverage ▮ IV formulation not approved in children ▮ Injection contains benzyl alcohol
	▮ Caution: seizures, cardiovascular, renal, hepatic, or respiratory disease ▮ SE: EPS (more common in children, but rare in low doses), akathisia (which can mimic anxiety)		
Selective Serotonin Reuptake Inhibitors (SSRIs)			
escitalopram (Lexapro) > 12 yoa	**<> 12 yoa:** 5-10 mg/day **Max:** 20 mg/day	**PO**	**Solution:** 1 mg/mL **Tablets:** 5, 10, 20 mg ▮ Solution has propylene glycol & sorbitol
	▮ FDA approved for anxiety in adults		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
FLUoxetine13 (PROzac) > 8 yoa DR: >18 yoa	**<6 yoa:** 5 mg/day or 0.25 mg/kg/day **Max:** 20 mg/day **Adult:** 20 mg/day **Max:** 80 mg/day	**PO**	**Solution:** 20 mg/5 mL **Tablets:** 10, 20, 60 mg **Capsules:** 10, 20, 40 mg ▮ Solution contains benzoic acid ▮ DR (weekly) not recommended in children
	▮ Not FDA approved for anxiety in children; may be appropriate if anxiety secondary to depression ▮ Longest t½ & least expensive SSRI ▮ Caution: hepatic or renal failure ▮ Myotoxicity, impaired bone development, long-term neurobehavioral and reproductive toxicity		
sertraline (Zoloft) > 6 yoa	**6-12 yoa:** 12.5-25 mg/day **>13 yoa:** 25-50 mg/day **Max:** 200 mg/day ▮ Lower doses as effective, with ↓ SE	**PO**	**Solution:** 20 mg/mL **Tablets:** 25, 50, 100 mg ▮ Mix solution with 4 oz liquid ▮ Solution dropper contains rubber
	▮ FDA approved for anxiety in adults ▮ Withdrawal symptoms possible at end of life		
Tricyclic Antidepressant (TCA)			
amitriptyline (Elavil) > 12 yoa	**> 6 yoa:** 0.33 mg/kg tid **Max:** 1.5 mg/kg/day outpatient; 3-5 mg/kg/day if hospitalized **>12 yoa:** 25-75 mg qhs **Max:** 200 mg/day outpatient; 300 mg/day if hospitalized	**PO**	**Tablets:** 10, 25, 50, 75, 100, 150 mg
	▮ Not approved for anxiety; depression dosing ▮ Extremely sedating TCA ▮ Also used for chronic pain, migraine, and as a hypnotic		
desipramine (Norpramin) > 12 yoa	**6-12 yoa:** 1-3 mg/kg/day divided bid **Max:** 5 mg/kg/day **>12 yoa:** 50-75 mg/day divided bid **Max:** 200 mg/day in outpatients; 300 mg/day for hospitalized patients	**PO**	**Tablets:** 10, 25, 50, 75, 100, 150 mg
	▮ Not approved for anxiety; depression dosing ▮ Thorough cardiovascular assessment prior to initiation ▮ Least sedating TCA ▮ Blood levels useful for therapeutic monitoring		
doxepin (SINEquan) > 12 yoa Tablets: >18 yoa	**7-11 yoa:** 1-3 mg/kg/day **> 12 yoa:** 25-75 mg qhs or divided q8-12h **Max:** 300 mg/day **Adult:** 25-150 mg qhs or divided q8-12h	**PO**	**Solution:** 10 mg/mL **Tablets:** 3, 6 mg (no generic; approved for insomnia in adults) **Capsules:** 10, 25, 50, 75, 100, 150 mg ▮ Tablets not recommended in children
	▮ Approved for various anxiety disorders in children >12 yoa ▮ SE: sedation, clinical worsening of depression or suicidal ideation		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
nortriptyline (Pamelor) > 12 yoa	**6-12 yoa:** 1-3 mg/kg/day divided 3-4 doses **Max:** 3 mg/kg/day (or 150 mg/day) **Adolescent:** 1-3 mg/kg/day divided Adult: 25-50 mg/day divided or qhs **Max:** 150 mg/day	PO	**Solution:** 10 mg/5 mL **Capsules:** 10, 25, 50, 75 mg ▮ May contain benzoic acid
	▮ Not approved for anxiety or in children; depression dosing ▮ Caution (extreme): renal or hepatic impairment ▮ Least likely TCA to cause orthostasis ▮ Therapeutic range: 50-150 ng/mL		
Antihistamine			
hydrOXYzine (Atarax/Vistaril) > 2 yoa	**<6 yoa:** 2 mg/kg/day or 50 mg divided q6-8h **≥6 yoa:** 50-100 mg/day divided q6-8h	PO IM	**Solution :** 10 mg/5 mL (Atarax), 25 mg/5 mL (Vistaril) **Tablets:** 10, 25, 50 mg **Capsules:** 25, 50, 100 mg **Injection:** 25, 50 mg/mL ▮ IM painful; IV & SQ not recommended ▮ Injection contains benzyl alcohol
	▮ Atarax (hydrOXYzine HCL) & Vistaril (hydrOXYzine pamoate) are different salt forms of same active drug ▮ Appropriate for short term use (e.g procedural) ▮ SE: sedation (very)		
Miscellaneous			
busPIRone[14-15] (Buspar) > 6 yoa	**6-14 yoa:** 5 mg/day **Adult:** 7.5 mg bid **Max:** 60 mg/day	PO	**Tablet:** 5, 7.5, 10, 15, 30 mg
	▮ Safety & effectiveness not established in pediatrics; studied in patients as young as 6 years of age ▮ Caution: renal or hepatic dysfunction ▮ High rate of discontinuation due to aggression and agitation		

**Use cautiously in patients outside of FDA & manufacturer recommended age parameters. **Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

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Agitation/Delirium

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Introduction and Background[1-4]

- According to the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV), delirium is a disturbance of consciousness and cognition that develops over a short period, usually hours to days, and fluctuates over time. 5
- Serious physical illness can cause widespread cerebral dysfunction, leading to the development of delirium.
- Delirium has been associated with rates of morbidity and mortality that surpass those of all other psychiatric diagnoses.
- Agitation is an unpleasant state of increased arousal. 6-7
- Terminal agitation, also known as terminal restlessness, is agitated delirium at the end of life. It is commonly associated with impaired consciousness and non-purposeful movement.8

Causes[3-4, 9-10]

- Many different factors contribute to the development of delirium or agitation in children (Table 1).
- Given the advanced state of illness in this patient population, multiple causes of delirium may simultaneously coexist, adversely affecting the metabolic environment of the whole brain.
- Certain patients may be at higher risk of developing delirium (Table 2). Being aware of the potential risk factors may help recognize the signs more quickly or even prevent them.

Table 1. Causes of Agitation & Delirium[3-4,9]

Cause	Examples
Biochemical	Hypercalcemia, hyperosmolality, hypoglycemia, hyponatremia
Cerebral disease	Cancer, cerebral vascular accident, hypoxia, sepsis
Discomfort	Constipation, dyspnea, muscle spasm, pain, sleep deprivation, urinary retention
Drugs	Anticholinergics, benzodiazepines, corticosteroids, opioids, steroids, withdrawal
Infection	Urinary, neurological, respiratory, septicemia
Organ failure	Kidney, liver
Psychosocial	Anxiety, emotional or spiritual distress, fear, vision or hearing impairment

Table 2. Risk Factors for Delirium1

Predisposing Factors	Precipitating Factors	Environmental Factors
▮ Age ▮ Genetic predisposition ▮ Neurological disease ▮ Psychiatric illness ▮ Visual impairment ▮ Hearing impairment ▮ Surgery	▮ Electrolyte disturbances ▮ Hypoxia ▮ Acidosis ▮ Hypoalbuminemia ▮ Fever ▮ Hypotension ▮ Sepsis ▮ Infection ▮ Polypharmacy ▮ Oversedation ▮ Medication withdrawal ▮ Sleep deprivation	▮ Immobility ▮ Light ▮ Noise ▮ Reduced social interactions ▮ Pain ▮ IV lines in place ▮ Physical restraints

Clinical Characteristics[1-3,9-14]

- Symptoms of delirium can vary greatly by patient, especially in pediatric patients (Table 3), and are often reversible.
- Pediatric patients may have subtle developmentally specific symptoms and signs of delirium.
- In children, agitation may present as loud or angry speech, crying, increased muscle tension, diaphoresis, tachycardia, or irritable mood.6 While the symptoms of agitation overlap with symptoms of anxiety, agitation typically includes more motor symptoms, rather than psychological.7
- Criteria for delirium include sudden onset and fluctuating symptoms throughout the day (Table 4).
- At the end of life, delirium may have a more gradual onset and may be refractory to treatment.
- Three clinical subtypes of delirium, hypoactive, hyperactive, and mixed, are recognized in both adult and pediatric patients (Table 5).
- The term hyperactive delirium refers to patients who present with symptoms of confusion, psychosis, disorientation, agitation, hypervigilance, hyperalertness, fast or loud speech, combativeness, and behavioral problems.
- Patients with hypoactive or silent delirium present with somnolence, decreased activity, slow or decreased speech, psychomotor slowing, withdrawal, apathy, and confusion.
- Mixed delirium describes patients who fluctuate between hyperactive and hypoactive states. These critically ill patients present with an array of symptoms, in the context of possible pain, anxiety, and nausea, making it difficult to recognize delirium and identify the cause.

Table 3. Common Symptoms of Agitation & Delirium[2,6,9,15]

Category	Agitation Symptoms	Delirium Symptoms
Cognitive disturbance	Inability to concentrate or relax	↓ alertness, attention, orientation, impaired memory, confusion, lethargy
Daily course	Alteration of sleep-wake cycle, terminal restlessness	Alteration of sleep-wake cycle, fluctuating nature, terminal restlessness
Language & thought disturbance	Angry or loud speech	Speech disturbance, delusions, vigilant/paranoid thinking
Mood changes	Crying, irritability	Anxious, depressed, irritable, labile, or abnormal affect
Perceptual disturbance	n/a	Auditory or visual hallucinations, altered perception
Psychomotor alterations	Frequent, non-purposeful movements, ↑ muscle tension	Agitation, apathy, psychomotor retardation

Table 4. Delirium Criteria[1,5]

Criteria	Symptoms
Disturbance of consciousness	Decreased awareness of environment, reduced ability to focus, sustain or shift attention
Change in cognition	Memory deficit, disorientation, language disturbance, or development of a perceptual disturbance
Temporal character	Develops over a short period, usually hours to days, and fluctuates during the course of the day
Etiology	History, physical exam, laboratory findings of general medical condition related to the disturbance

Table 5. Delirium Subtypes[1,14]

Subtype	Hyperactive	Hypoactive	Mixed
Clinical features	▮ Psychomotor agitation ▮ Increased verbal fluency & volume ▮ Restlessness ▮ Hyperarousal ▮ Hallucinations	▮ Psychomotor retardation ▮ Diminished speech production & volume ▮ Apathy ▮ Withdrawal	▮ Presence of hyperactive and hypoactive symptoms
Notes	▮ More easily identified ▮ Needs higher level of care ▮ Needs restraint for safety ▮ More distressing to family & patient	▮ Often overlooked ▮ Often misdiagnosed as depression or oversedation ▮ More common in adults	▮ Diagnosis confounded by mixed clinical picture
Possible etiologies	▮ Drug withdrawal ▮ Anti-cholinergic medications	▮ Hepatic ▮ Metabolic encephalopathies ▮ Acute sedative or analgesic intoxication ▮ Hypoxia	▮ Multiple etiologies
Pathophysiology	▮ Fast or normal EEG ▮ Increased cerebral metabolism ▮ Decreased GABA activity	▮ Diffuse slowing on EEG ▮ Decreased cerebral metabolism ▮ Increased GABA activity	▮ Multiple pathways
Treatment options	▮ Typical antipsychotic	▮ Atypical, typical antipsychotic	▮ Atypical antipsychotic

Assessment

- Diagnosis and assessment of delirium may be difficult in young children. Developmental age and maturity level should be considered when assessing children.[16]
- Identify any potential reversible causes (Table 1)
  - Evaluate electrolytes if appropriate
  - Assess for signs of infection
  - Consider other causes of discomfort (e.g., pain, spasm, dyspnea, urinary retention, fecal impaction, sleep deprivation, etc.)
- Evaluate for possible delirium subtype

- Complete psychosocial & medication history
- Family/caregiver observations and concerns
- Although not validated in children, there are numerous tools available to help assess symptoms of delirium (Table 6).[3] These scales should be adjusted to the appropriate developmental level of the child to adequately assess symptoms in this population. The Delirium Rating Scale was shown applicable in children with scores comparable to adults.[12]
- The Pediatric Confusion Assessment Method for ICU (Figure 1) has been validated in critically ill children greater than five years of age.[13] This tool is used in combination with the Richmond Agitation Sedation Scale (RASS) (Table 7).[17] A similar scale was developed for emergence delirium after receiving sedation, The Pediatric Anesthesia Emergence Delirium Scale (Table 8).[18] While not developed for patients in hospice or palliative care, these scales may be useful to assess delirium in the pediatric population.

Table 6. Delirium Assessment Tools[3] *(Not validated in children)*

Measure	Tool
Cognitive Disturbance	▮ Mini-Mental State Exam
Delirium Symptoms	▮ Delirium symptom Interview ▮ Confusion Assessment Method
Delirium Symptom Severity	▮ Delirium Rating Scale ▮ Memorial Delirium Assessment Scale

Figure 1. Pediatric Confusion Assessment Method for the ICU (pCAM-ICU)[13]

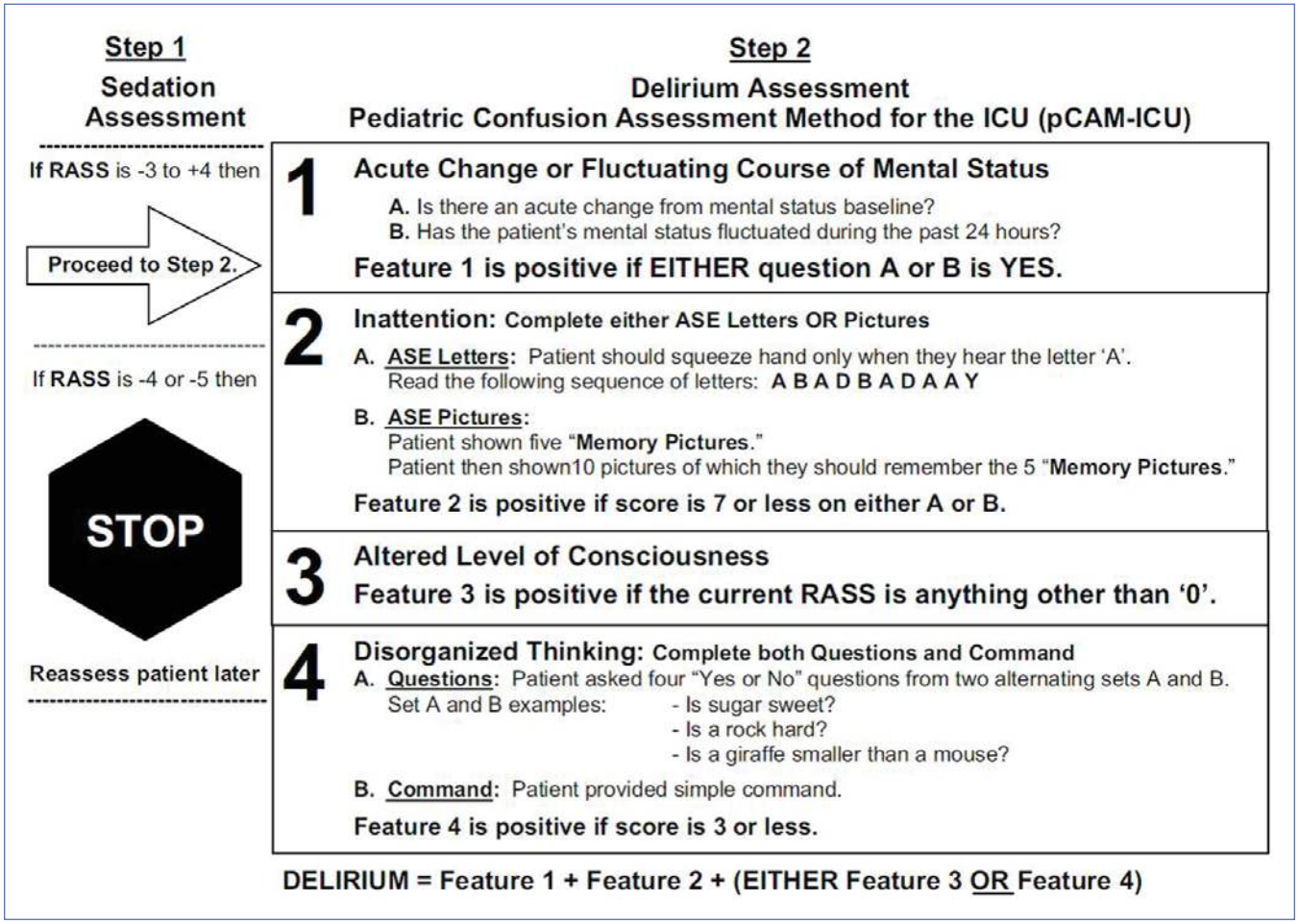

Table 7. Richmond Agitation Sedation Scale (RASS)[17]

Score	Term	Description
+4	Combative	Overtly combative, violent, immediate danger to staff
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive
+2	Agitated	Frequent on-purposeful movement, fights ventilator
+1	Restless	Anxious, but movements not aggressive
0	Alert and calm	
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact to voice (>10 seconds)
-2	Light sedation	Briefly awakens with eye contact to voice (<10 seconds)
-3	Moderate sedation	Movement or eye opening to voice (but no eye contact)
-4	Deep sedation	No response to voice, but movement or eye opening to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

Table 8. Pediatric Anesthesia Emergence Delirium Scale (PAED Scale)[18]

Score	0	1	2	3	4
Makes eye contact with caregiver	Extremely	Very much	Quite a bit	Just a little	Not at all
Actions are purposeful	Extremely	Very much	Quite a bit	Just a little	Not at all
Aware of his/her surroundings	Extremely	Very much	Quite a bit	Just a little	Not at all
Restless	Not at all	Just a little	Quite a bit	Very much	Extremely
Inconsolable	Not at all	Just a little	Quite a bit	Very much	Extremely
Score >10 compatible with delirium. Score 7-9 may indicate subsyndromal delirium requiring reevaluation.					

- Establish a safe, soothing environment
  - Familiar staff, family, objects, bedding, toys, photographs, smells, and music
  - Minimal noise
  - Adequate lighting
- Avoid vitals, medications, or stimulation over-night
- Provide appropriate day/night cycles of light and stimulation
- Minimize risk of injury (especially for agitated patients)
- Educate caregivers about delirium, its causes, and the plan of treatment
- Soft restraints, if needed, using the least restrictive methodThe first step for treatment of delirium or agitation is to identify and treat potential causes. If the underlying cause or causes of delirium can be corrected, delirium usually resolves in a matter of hours to days.
- For children with delirium, typical antipsychotics are the mainstays of treatment. Haloperidol (Haldol) is the drug of choice in children >3 years of age.
- Benzodiazepines can be effective in combination with haloperidol and can decrease the risk of extrapyramidal symptoms (EPS) seen with haloperidol. However, when used alone, benzodiazepines may worsen delirium. Benzodiazepines can also cause paradoxical agitation and delirium at higher doses. For children with acute agitation, benzodiazepines are the first-line treatment.
- Atypical antipsychotics should be considered in patients with hypoactive or mixed delirium.1 These agents should be used cautiously due to the risk of increased cardiometabolic adverse effects, such as age-inappropriate weight gain, obesity, hypertension, and lipid and glucose abnormalities.19
- Onset of action is delayed with antipsychotics compared to benzodiazepines.
- Start at the lower end of the dosing range of a given pharmacological agent but recognize that standard or higher doses may be required. Assess treatment response and side effects frequently. Clinical situations requiring antipsychotic medication doses more than those recommended for approved indications are unusual.

- Patients should be monitored for the risk of QT prolongation when using antipsychotics.
- Consider palliative or respite sedation if symptoms are not controlled with optimal doses of antipsychotics.
- PHENobarbital or antihistamines can be used as second-line agents in pediatric patients with agitation. PHENobarbital has been shown effective, especially in those patients with cerebral irritation.
- Avoid abrupt discontinuation of antipsychotics, benzodiazepines, and barbiturates.
- Aggressively treat possible causes of agitation or delirium, including sleep deprivation.

Table 9. Pharmacological Management of Agitation & Delirium[20]

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Typical Antipsychotics[21]			
chlorproMAZINE (Thorazine)[23] ≥6 months	**6 mon-12 yoa:** 0.5-1 mg/kg q6h **Max:** <5 years: 40 mg/day **Max:** 5-12 years: 75 mg/day **PR:** 1 mg/kg q6-8h prn **Adult:** PO: 30-200 mg/day **IM/IV:** 25 mg q6h Max: 400 mg	**PO** **SL** **PR** **IM** **IV**	**Tablets:** 10, 25, 50, 100, 200 mg **Injection:** 25 mg/mL ▮ Tablets contain benzoic acid ▮ IV: dilute with NS to max concentration: 1 mg/mL. NTE 0.5 mg/minute. Hypotension risk with IV. ▮ Do not administer SQ (tissue damage)
	▮ 6 months-12 yoa: PO used more than IM/IV ▮ EPS may occur in pediatric patients ▮ May lower seizure threshold; Do not administer with carbamazepine suspension ▮ Caution: cardiovascular, renal, hepatic, chronic respiratory, or seizure disorders		
haloperidol (Haldol)[22] ≥3 yoa IV: >18 yoa	**3-12 yoa:** **Agitation:** PO: 0.01-0.03 mg/kg/day **Psychosis:** PO: 0.015-0.075 mg/kg q8-12h **Max:** 0.15 mg/kg/day ▮ >6 mg/day no ↑'d efficacy **>12 yoa:** **Agitation PO:** 1-15 mg/dose **Psychosis:** PO: 0.5 mg-5 mg bid **IM (lactate):** 2-5 mg q4-8h prn **Usual Max:** 30 mg/day	**PO** **SQ** **IM** **PR** **SL**	**Solution:** 2 mg/mL **Tablets:** 0.5, 1, 2, 5, 10, 20 mg **Injection (lactate):** 5 mg/mL ▮ Avoid contact with oral solution and skin, may cause contact dermatitis ▮ Dilute oral solution in water or acidic beverage ▮ IV formulation not approved in children
	▮ Deaconate form not recommended for delirium ▮ Avoid IV push due to risk of QT prolongation ▮ EPS common in children, but rare in low doses ▮ Caution: seizures, cardiovascular, renal, hepatic, or respiratory disease		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Atypical Antipsychotics[18,24]			
ARIPiprazole (Abilify)[29-31] ≥6 yoa IV: >18 yoa	**6-17 yoa:** **PO:** 2 mg/day **Max:** 15 mg/day **Adult:** **PO:** 10-15 mg/day **IM:** 9.75 mg **Max:** 30 mg/day ▮ >10 mg/day no ↑'d efficacy ▮ No pediatric delirium dosing	**PO** **IM**	**Solution:** 1 mg/mL **Tablets:** 2, 5, 10, 15, 20, 30 mg **Tablets, ODT:** 10, 15 mg **Injection:** 7.5 mg/mL ▮ Oral solution contains propylene glycol ▮ ODT tablets contain phenylalanine ▮ Injection not approved in children ▮ Not available generically
	▮ Studied for agitation in autism patients[32] ▮ May increase risk of suicidal thinking/behavior in children and young adults ▮ Caution: seizures ▮ May cause neuroleptic malignant syndrome ▮ SE (↑ in children): EPS, fatigue, somnolence, weight gain		
OLANZapine (ZyPREXA)33-35 ≥13 yoa ER IM: >18 yoa	**4-6 yoa:** PO: 1.25 mg qhs, IM: 5 mg **6-12 yoa:** PO: 2.5 mg qhs, IM: 10 mg **>12 yoa:** PO: 5 mg qhs, IM: 10 mg **Max:** PO: 20 mg/day, IM: 30 mg/day ▮ No PO delirium dosing	**PO** **IM**	**Tablets:** 2.5, 5, 7.5, 10, 15, 20 mg **Tablets, ODT:** 5, 10, 15, 20 mg **Injection:** 10 mg ▮ Short-acting injection contains lactose ▮ ER IM injection not approved in children; associated with post injection delirium
	▮ Warnings: neuroleptic malignant syndrome, hyperglycemia ▮ SE (↑ in children): weight gain, sedation, ↑LDL cholesterol, total cholesterol, triglycerides, prolactin, & liver transaminase levels		
QUEtiapine (SEROquel)[36] >10 yoa	**> 10 yoa:** 25 mg bid **Adult:** 25-50 mg bid **Max:** 800 mg/day ▮ No pediatric delirium dosing	**PO**	**Tablets:** 25, 50, 100, 150, 200, 300, 400 mg
	▮ Delirium considered off label use ▮ Can increase suicidal thoughts or actions in children ▮ Most sedating of atypical antipsychotics ▮ SE: hypertension, somnolence, headache, EPS, hyperglycemia, xerostomia, weight gain, constipation, cholesterol alterations		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
risperiDONE (RisperDAL)[14,25-28] ≥5 yoa	**4 mon- 5 yoa:** 0.1-0.2 mg qhs **>5 yoa:** 0.2-0.5 mg qhs **Max:** <20 kg: 1 mg/day; 20-45 kg: 2.5 mg/day; >45 kg: 3 mg/day **Adult:** 0.25-1 mg bid	**PO**	**Solution:** 1 mg/mL **Tablets:** 0.25, 0.5, 1, 2, 3, 4 mg **Tablets, ODT:** 0.25, 0.5, 1, 2, 3, 4 mg ▮ Solution contains benzoic acid ▮ ODT tablets contain phenylalanine
	▮ Drug of choice ▮ Extensive metabolism in liver by CYP2D6 ▮ Warnings: EPS (at higher doses), lowers seizure threshold, neuroleptic malignant syndrome, hepatotoxicity in pediatric patients24,27 ▮ Caution: seizures, renal or hepatic impairment ▮ SE (↑ in children): weight gain, sedation, leukocytopenia, fever, constipation, increased salivation, abdominal pain, dry mouth		
Benzodiazepines- for Agitation			
clonazePAM (KlonoPIN)	**0.01 mg/kg q8-12h** **Max:** 0.2 mg/kg/day **Adult:** 0.25 mg bid **Max:** 4 mg/day ▮ No specific agitation dosing	**PO** **SL/buccal** **PR**	**Suspension:** 0.1 mg/mL **Tablets, ODT:** 0.125, 0.25, 0.5, 1, 2 mg **Tablets:** 0.5, 1, 2 mg ▮ Tabs may be crushed for SL or PR ▮ ODT tabs expensive ▮ Injection not available in U.S.
	▮ Not FDA approved for agitation in children ▮ Caution: respiratory, hepatic, or renal dysfunction ▮ SE: drooling, sedation, cognitive effects, increased risk of suicidal behavior or ideation ▮ Avoid abrupt discontinuation		
diazepam (Valium) >6 months	**PO:** 0.12-0.8 mg/kg/day divided **IM, IV:** 0.04-0.3 mg/kg q2-4h prn **Max:** 0.6 mg/kg in 8 hours **Adult:** PO: 2-10 mg bid-qid **IM, IV:** 2-10 mg q3-4h prn ▮ Dosing for anxiety, sedation, muscle relaxation	**PO** **SL/buccal** **PR** **IM (poor)** **IV**	**Solution:** 5 mg/5 mL, 5 mg/mL **Tablets:** 2, 5, 10 mg **Injection:** 5 mg/mL **Rectal gel (Diastat):** 2.5, 10, 20 mg ▮ Tabs may be crushed for SL or given PR ▮ Well absorbed PR (slower) and SL ▮ Rectal gel typically used for seizures ▮ IV formulation may be given PR ▮ Dilute injection & administer at a rate NTE 2 mg/min. Rapid IV push may cause apnea. ▮ Injection contains benzyl alcohol.
	▮ Pediatric population more sensitive to SE ▮ Avoid abrupt discontinuation ▮ Long acting; active metabolites can accumulate ▮ Reports of pain & thrombophlebitis via IV ▮ Significant drug interactions		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
LORazepam (Ativan)	**0.05 mg/kg q4-8h** **Max:** 2 mg **Adult:** 1-10 mg/day in 2-3 divided doses ▮ Dosing for anxiety, sedation	**PO** **SL** **PR** **IM** **SQ** **IV**	**Solution:** 2 mg/mL **Tablets:** 0.5, 1, 2 mg **Injection:** 2, 4 mg/mL ▮ IV and oral solutions contain benzyl alcohol, polyethylene, and propylene glycol ▮ Tablets can be crushed ▮ IV: dilute with equal volume; IVP over 2-5 min ▮ IV form may be given rectally
	▮ Drug of choice ▮ Children are more susceptible to the therapeutic effects ▮ Short-acting; no active metabolites ▮ Less risk of hypotension than midazolam[6]		
midazolam (Versed) >6 months	**PO/PR:** 0.2-0.5 mg/kg **Intranasal:** 0.2 mg/kg **IV:** 0.05 mg/kg; IM: 0.1-0.15 mg/kg **Max:** 10 mg; IM: 6 mg **Cont IV:** 0.06-0.12 mg/kg/hr ▮ Dosing for sedation ▮ Dose based on ideal body weight in obese	**PO** **SL/Buccal** **Intranasal** **IV** **SQ** **IM**	**Syrup:** 2 mg/mL **Injection:** 1, 5 mg/mL ▮ Injection may be given buccally ▮ Oromucosal as effective as IV or PR diazepam ▮ Divide IN between nares ▮ Do not administer by rapid IV in neonates
	▮ Short-acting; rarely used for agitation ▮ May be useful as SQ continuous infusion for terminal restlessness37 ▮ Higher risk of respiratory depression6 ▮ Infants <6 months at higher risk for airway obstruction and hypoventilation		
Barbiturates- for Terminal Sedation			
PHENobarbital[38]	**PO:** 2 mg/kg q8h **IV/IM/SQ:** 3-5 mg/kg qhs **Adult:** 30-120 mg/day ▮ Dosing for sedation	**PO** **PR** **IV** **IM** **SQ**	**Elixir:** 20 mg/5 mL **Tablets:** 15, 16.2, 30, 32.4, 60, 100 mg **Injection:** 65, 130 mg/mL ▮ Well absorbed rectally, same dose as oral ▮ Dilute injection with equal volume of compatible fluid and administer at a rate NTE 1 mg/kg/min. Risk of extravasation. ▮ An alcohol-free suspension can be made from PHENobarbital tablets (10 mg/mL)
	▮ Used for terminal sedation; not routinely used for delirium or agitation ▮ Significant drug interactions ▮ Can cause hyperactivity in younger children ▮ SE: Cognitive dysfunction, sedation, rash, ↓ bone density, respiratory depression ▮ Signs of toxicity: drowsiness, nystagmus, ataxia ▮ Avoid abrupt discontinuation ▮ May aggravate absence seizures in high doses ▮ More sedating than benzodiazepines		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Antihistamine			
hydrOXYzine (Atarax/Vistaril) > 2 yoa	**PO/IM:** 0.5 mg/kg q6h **Max:** <6 yoa: 50 mg/day; >6 yoa: 100 mg/day **Adult, PO/IM:** 50-100 mg q6h ▮ Dosing for anxiety	**PO** **IM**	**Solution :** 10 mg/5 mL (Atarax), 25 mg/5 mL (Vistaril) **Tablets:** 10, 25, 50 mg **Capsules:** 25, 50, 100 mg **Injection:** 25, 50 mg/mL ▮ IM painful; IV & SQ not recommended ▮ Injection contains benzyl alcohol
	▮ Atarax (hydrOXYzine HCL) & Vistaril (hydrOXYzine pamoate) are different salt forms of same active drug		

**Use cautiously in patients outside of FDA & manufacturer recommended age parameters. **Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

Excerpted from Hunt MO, Protus BM, Winters JP, Parker DC. Pediatric Palliative Care Consultant: Guidelines for Effective Management of Symptoms. Montgomery, Al: HospiScript; c2014. p. 37-47.

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Respiratory Distress, Secretions, Dyspnea

Respiratory Distress (MUSIC)

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Similarly to pain, respiratory management can be an extremely difficult symptom to find consistency in management as the disease progresses. Music therapy has the capacity to offer an individualized approach with interventions that are quick to adapt as the needs change. Through the utilization of entrainment with respiration and the iso-principle, there has been consistent research indicating that music has the ability to alter the rate of breathing to promote consistency and stabilization. In the NICU, we see that neonates have a strong connection to the ocean disc, which mimics the sounds heard in the womb. Infants are then able to slow their breathing as the music therapist moves the disc in a way to match the respiration rate. In children and adults, there is significant research showing that singing and rhythmic instruments can also match and alter the rates of breath. The music therapist utilizes live-engagement and interaction to individualize the techniques needed to promote consistent breathing and maintain a target respiration and/or heart rate according to the individual's age.

Respiratory Distress/Secretions, Dyspnea

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- Music for relaxation: this includes using music guided by patient's respiratory rate, using musical elements to match patient's current state and modifying musical elements to shift to a more ideal mood state, utilizing a steady consistent tempo, and low arousal music.
- Musical entrainment, or also called iso-principle technique: used to increase sense of relaxation by entraining the patient to, and then systematically manipulating, musical parameters (i.e., tempo, dynamics, rhythmic complexity, melodic complexity, harmonic complexity) across the session. Once entrained, the musical parameters are then changed to decreasing complexity to alter behavioral and physiologic indicators (e.g. activity level, mood and affect presentation, and respiration rate) to either maintain or achieve a more relaxed state (Millett & Gooding, 2017).

Millett, C. R., & Gooding, L. F. (2017). Comparing active and passive distraction-based music therapy interventions on preoperative anxiety in pediatric patients and their caregivers. *Journal of music therapy*, 54(4), 460-478.

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Respiratory Distress: Child life support may not necessarily be able to impact the symptom of respiratory distress directly, but it can provide relief via distraction while medical procedures are undertaken to relieve this symptom. Also notable is the support that a Child Life Specialist can provide in educating a child afterwards about causes of respiratory distress or onset of difficulty of breathing.

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Respiratory distress/secretions/Dyspnea: The inability to breathe or breathe fully induces fear and anxiety, and may lead to full-on panic, particularly when it is a first experience, but also when there is awareness and anticipation of a repeated event. CCLS provide information of a diagnosis in age-appropriate vocabulary through therapeutic play, bringing awareness of possible symptoms to the child or adolescent while providing coping and expressive interventions. Diaphragmatic breathing, or "bubble breathing" in Child Life terminology, introduces the patient to a measure of control in an event when they would otherwise have none. The somatic effects of controlled breathing are a counterbalance to respiratory distress and anxiety-inducing medical procedures. It is a learned intervention, transferrable to an array of stressful situations that arise during hospice care. Learning a skill which enables the patient to self-regulate and be a participant in their own care is very empowering for young patients, affording a moment of pride. In supporting the medical staff of the multi-disciplinary team during invasive procedures, such as suctioning, a CCLS may implore tenets of mindfulness, distraction, or positioning to improve compliance. Affording expressive therapeutic opportunities post-procedures, in whatever capacity the patient can engage, validates emotions and supports the right to express feelings, which reduces physical and emotional reactions while developing skills to convert an adverse reaction to a conscious response

Secretions

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Introduction and Background[1-4]

- Excessive secretions are often troublesome in dying patients. Secretions can partially obstruct the airway and lead to increased airway resistance and increased work of breathing. Secretions can also precipitate the sensation of dyspnea and result in loss of sleep.
- Saliva consists of two components, a thin watery secretion (sialorrhea) and thick mucus, which are produced by different salivary glands.
- Consider sialorrhea separately from thicker respiratory tract secretions. Sialorrhea is often seen as drooling with leakage of saliva from the mouth as a result of diminished oral sensation of saliva. Salivation is a result of stimulation of the muscarinic subtype-3 receptor (M3).
- Excessive secretions are common, but can be managed by treating the underlying cause, non-pharmacological therapy, or medications.
- The goal of treatment is to decrease morbidities associated with secretions, such as dyspnea or insomnia, and to improve quality of life.
- Noisy terminal secretions (also known as "death rattle") are a common sign at the end of life. As patients lose their ability to swallow and clear oral secretions, accumulation of mucus results in a rattling or gurgling sound produced by air passing through mucus in the lungs and air passages.
- Initiate discussions with family and caregivers that the sound does not represent discomfort for the patient. However, if the sound is extremely distressing to the family, medications may be helpful.

Causes[1,4]

- Sialorrhea can be caused by three different factors:
  - Excessive production of saliva
  - Inability to retain saliva in the mouth
  - Difficulty swallowing
- Excessive production alone is generally not a problem, unless accompanied by one or both of the other two factors.
- Thick secretions often have reversible causes that should be identified and treated (Table 1) whereas causes of sialorrhea may not be reversible.

Table 1. Causes of Secretions

Causes of Sialorrhea	Causes of Thick Secretions
Neurodegenerative disorders	Tube feedings
Abnormalities of the mouth, jaw, or nasopharynx	Fluid overload and edema
Cancer affecting the mouth	Dehydration
Dysphagia	Infection
Psychological	Medications (anticholinergics, antiepileptics)
Fluid overload and edema	
Medications (cholinergics, antipsychotics, SSRIs, antiepileptics)	

Clinical Characteristics[2-3,7-8]

- The noise of terminal secretions is produced by the oscillatory movements of secretions in the upper airways of patients who are obtunded or too weak to expectorate.
- If secretions are secondary to pneumonia or pulmonary edema, anticholinergics will have limited benefit.

Table 2. Symptoms of Sialorrhea[1]

- Aspiration pneumonia
- Breathing difficulties
- Choking
- Constant need to change bibs or clothing
- Coughing
- Dermatitis around mouth, lips, chin
- Dysphagia
- Social stigma

Assessment[1,9]

- Patient's ability to swallow
- Characteristics of secretions (color, odor, blood, signs of infection)
- Potential causes (Table 1)
- Infant teething
- Oral hygiene practices
- Presence of an NG tube
- Hydration status (fluid intake)
- Exposure to environmental allergens
- Cough/gag reflex
- Benefit versus burden of suctioning
- Child and family concerns

Non-Pharmacological Treatment[1,3,7,9]

- Provide education for child and family on the risks and benefits of fluid intake
- Maintain communication with child regarding changing dietary wishes
- In cases of sialorrhea, facilitate nutrition consult for foods with maximum nutrition and limited fluids
- Encourage mouth care, ice chips, flavored popsicles, moistened oral swabs
- Provide ample small cloths for secretions as needed
- Position patient on his/her side or in a semi-prone position at least every two hours to help facilitate drainage of secretions

- Oropharyngeal suctioning, particularly in children with excessive or difficult-to-manage secretions
  - Avoid "deep" suctioning at end of life to prevent abrasion and/or bleeding
- Consider use of a bulb syringe for smaller children
- Mobilization and exercise to help facilitate movement of thick secretions (any measure of activity is better than none)

Pharmacotherapy[1,2,4,6]

- If the patient is alert and able to expectorate, but the secretions are thick, then pharmacological therapy that thins mucus can be implemented. Fluid, particularly water, administered orally or parenterally is the best approach to thinning secretions.
- If the patient is unable to expectorate, the emphasis of therapy is to dry secretions. Adjust medication dose and frequency to prevent secretions from becoming too thick or tenacious. Thick secretions may become more difficult to move within the airways, leading to formations of large, solid mucous plugs, and worsening respiratory symptoms.
- Anticholinergic drugs remain the standard of therapy for prevention and treatment of terminal secretions but should be reserved for patients unable to expectorate. Anticholinergic drugs reversibly block cholinergic muscarinic receptors, specifically M3, resulting in decreased saliva production.
- No medication will dry secretions that are already present (see Non-Pharmacological Treatment).
- Drugs used for this indication are similar pharmacologically and one can be selected by anticholinergic potency, onset of action, route of administration, and cost; there is no data to support superiority of one agent over another. Avoid use of multiple anticholinergic agents.
- Glycopyrrolate has a long duration of action and does not cross the blood brain barrier, thereby reducing the risk of central nervous system (CNS) side effects. These characteristics make glycopyrrolate a good option for chronic use. However, glycopyrrolate is a potent drying agent and has the potential to cause excessive dryness.
- Regardless of the agent chosen, when used for an extended period, monitor for signs of CNS side effects.
- Even if administered sublingually, anticholinergic medications have systemic effects and side effects are common (due to their lack of sensitivity for M3) and similar in this class. Side effects include blurred vision, constipation, urinary retention (catheter may be necessary), confusion, delirium, restlessness, hallucinations, dry mouth, and heart palpitations.
- Premature use in a patient who is still alert may lead to unacceptable drying of oral and pharyngeal mucosa or CNS side effects (sedation, confusion).

Table 3. Pharmacological Management of Secretions: Focus on DRYING[10-12]

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Atropine (Isopto Atropine)	**≤ 10 kg:** 1 drop SL of 0.25% solution Q6H PRN **> 10 kg:** 1 drop SL of 0.5% solution Q6H PRN **>12 yoa (or >25 kg):** 1 drop SL of 1% solution Q6H PRN	**SL**	**Ophthalmic Solution:** 1% (Administered SL) ▮ Atropine 0.25% and 0.5% solutions made by diluting 1% solution
	▮ Administered SL. Generally reserved for last 48 hours of life. ▮ 1 drop atropine 1% ophthalmic solution contains approximately 0.5 mg atropine ▮ To prepare atropine 0.5% solution combine atropine 1% with an equal volume of water ▮ To prepare atropine 0.25% solution combine 2.5 mL of atropine 1% with 7.5 mL of water ▮ SE: skin flushing, rapid or irregular heartbeat, fever, hallucinations		

<table>
<tr><th>Medication & Age Guide*</th><th>Typical Starting Dose**</th><th>Routes</th><th>Pediatric Formulation Considerations</th></tr>
<tr><td rowspan="2">Glycopyrrolate
(Robinul, Cuvposa)3

PO: >3 yoa
ODT: >18 yoa
IV: >1 month</td><td>PO: 40-100 mcg/kg Q6-8H
Adult: 1 mg Q12H
IM/IV: 4-10 mcg/kg Q3-4H
Adult: 0.2 mg Q6H
▮ Administer solution on empty stomach</td><td>PO
IM
IV</td><td>Solution: 1 mg/5 mL
Tablets: 1, 1.5, 2 mg
Tablets, ODT: 1.7 mg
Injection: 0.2 mg/mL
▮ Oral solution may contain propylene glycol
▮ Injection contains benzyl alcohol</td></tr>
<tr><td colspan="3">▮ Caution: infants, Down Syndrome, spastic paralysis, or brain damage (hypersensitive to effects)
▮ Paradoxical excitation may occur in infants
▮ Least likely to cross blood-brain barrier; less risk of confusion or visual changes
▮ SE: skin flushing, headache, vomiting, xerostomia, constipation, urinary retention, nasal congestion</td></tr>
<tr><td rowspan="2">Hyoscyamine
(Levsin, Hyomax-SL)

Approved ages vary by product

Drops: >3.4 kg
Elixir: >2 yoa
ODT: >2 yoa
ER tab >12 yoa
Tab: >12 yoa
IV: >18 yoa</td><td>< 2 yoa:
<table><tr><th>Weight (kg)</th><th>Dose (drops)</th><th>Max Daily Dose (drops)</th></tr><tr><td>3.4</td><td>4</td><td>24</td></tr><tr><td>5</td><td>5</td><td>30</td></tr><tr><td>7</td><td>6</td><td>36</td></tr><tr><td>10</td><td>8</td><td>48</td></tr></table>2-12 yoa: 0.0625-0.125 mg Q4H PRN, NTE 0.75 mg/day
>12 yoa: 0.125-0.25 mg Q4H PRN, NTE 1.5 mg/day</td><td>PO
SL</td><td>Elixir: 0.125 mg/5 mL
Solution (drops): 0.125 mg/mL
Tablets, ODT, SL : 0.125 mg
Tablets: 0.125 mg
Tablets, ER: 0.375 mg
Injection: 0.5 mg/mL
▮ Liquids may contain sodium benzoate or ethanol
▮ Disintegrating tablets contain aspartame
▮ IV not approved in children</td></tr>
<tr><td colspan="3">▮ May give SL tablet with a few drops of water to help dissolve tablets
▮ Low doses may cause paradoxical decrease in heart rate
▮ SE: flushing, headache, vomiting, xerostomia, constipation, urinary retention</td></tr>
<tr><td rowspan="2">Scopolamine
(Transderm Scōp)

Adults</td><td>>12 yoa: 1 patch every 3 days
▮ Difficult to dose in <12 yoa
▮ Approximately 12 hours to peak effect</td><td>TD</td><td>Transdermal Patch: 1 mg
▮ Apply patch to hairless area behind ear
▮ Do not cut patches
▮ Do not wear more than 1 patch at a time</td></tr>
<tr><td colspan="3">▮ Patch designed to deliver 1 mg over 3 days
▮ SE: drowsiness, confusion, visual changes</td></tr>
</table>

**Use cautiously in patients outside of FDA and manufacturer recommended age parameters. **Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

Table 4. Pharmacological Management of Secretions: Focus on THINNING[10]

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Acetylcysteine (Mucomyst)	**<1 yoa:** 1-2 mL of 20% solution or 2-4 mL 10% solution Q6-8H with nebulizer **>1 yoa:** 3-5 mL 20% solution or 6-10 mL 10% solution Q6-8H with nebulizer **Adolescent & Adult:** 5-10 mL of 10-20% solution Q6-8H with nebulizer ▮ Oral dosing used for acetaminophen overdose	IH	**Solution, nebulization:** 10, 20% ▮ Once opened, refrigerate, use within 4 days
	▮ Rarely used for secretions ▮ Administer aerosolized bronchodilator 10-15 minutes before acetylcysteine ▮ SE: nausea, vomiting, bronchospasm, fever, unpleasant odor		
Dornase alfa (Pulmozyme) ≥ 5 yoa	▮ Inhale 2.5 mg (1 vial) with selected nebulizer once daily	IH	**Solution, nebulization:** 2.5 mg/2.5 mL ▮ Do not dilute ▮ Do not mix with other drugs ▮ Refrigerate opened vial and use in 24 hr ▮ Refer to package insert for complete administration information
	▮ Expensive. Data only supports use in cystic fibrosis. Consider nebulized saline as alternative ▮ SE: cough, headache, fever, rash, urticaria		
GuaiFENesin **Immediate Release** (Robitussin) **Sustained Release** (SR) (Mucinex) >2 yoa **SR:** >12 yoa	**<2 yoa:** 2 mg/kg Q4H PRN9 **2-5 yoa:** 50-100 mg Q4H PRN, NTE 600 mg/day **6-11 yoa:** 100-200 mg Q4H PRN, NTE 1.2 g/day **>12 yoa:** 200-400 mg Q4H PRN or 600-1200 mg SR Q12H PRN, NTE 2.4 g/day	PO	**Liquid:** 100 mg/5 mL, 200 mg/5 mL **Granules:** 100 mg packets **Tablet, caplet:** 200, 400 mg **Tablet, SR:** 600, 1200 mg ▮ Liquid may contain benzoate ▮ Do not crush, chew or break SR tablet ▮ Safety/efficacy of SR tablets not established in children <12 yoa
	▮ Take with 8 ounces of water ▮ SE: drowsiness, headache, rash, nausea		
Saline, nebulized	Inhale 3 mL (1 vial) with nebulizer Q4-6H scheduled or PRN	IH	**Solution, nebulization:** 0.9% **Solution, nebulization:** 3%
	▮ Cost effective, well-tolerated treatment, especially if nebulizer already available in home		

**Use cautiously in patients outside of FDA and manufacturer recommended age parameters. **Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

Excerpted from Hunt MO, Protus BM, Winters JP, Parker DC. Pediatric Palliative Care Consultant: Guidelines for Effective Management of Symptoms. Montgomery, Al: HospiScript; c2014. p. 249-254.

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Dyspnea

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Introduction and Background[1-3]

- Dyspnea is a distressing subjective sensation of uncomfortable breathing, work of breathing, awareness of breathing, chest tightness, or "air hunger."
- Patients may describe dyspnea as shortness of breath or suffocation which can be upsetting symptoms for patients and their loved ones.
- The goal of therapy is to decrease the patient's perception of breathlessness.

Causes [1-2]

- Physical, psychosocial, and spiritual factors can all contribute to dyspnea (Table 1).
- The causes of dyspnea can vary and patients often have multiple contributing factors. Some underlying causes may be effectively treated; other causes cannot be reversed, and treatment focuses on supportive care (Table 2).

Table 1. Pathophysiological Mechanisms of Dyspnea[2,5]

Mechanisms	Causes	Treatment Options
Non-Reversible Causes		
Airway obstruction	Tumor, congenital anomalies of the airway	Non-pharmacological, opioid +/- benzodiazepine
Cardiac	Heart failure, pulmonary hypertension	
Muscle weakness	Cachexia, neuromuscular degenerative conditions, tracheomalacia	
Parenchymal failure	Cystic fibrosis (CF), pneumonia, interstitial disease	
Reversible Causes		
Anxiety	Fear of difficulty breathing, sensation of suffocation, fear of imminent death, impaired function, and inability to complete normal tasks	Benzodiazepine
Blood disorders	Anemia, metabolic acidosis	Consider red blood cell transfusion
Bronchospasm	Asthma	Inhaled bronchodilator +/- corticosteroid
Cough	Secretions, Infection, tumor	Expectorant or nebulized saline
Fluid in respiratory tract	Secretions, Infection, inflammation (tracheitis), Edema	Reduction of fluids; furosemide; corticosteroid

Mechanisms	Causes	Treatment Options
Pain	Rib pain (fracture, metastasis), inflammation (pleuritic pain)	Opioid +/- corticosteroid or NSAID
Pulmonary embolism	Clotting disorder	Anticoagulants for prevention and treatment
Pneumothorax or effusion	Malignancy, interstitial lung disease	Consider therapeutic thoracentesis
Secretions	Dehydration, medications	Weak cough reflex: anticholinergic

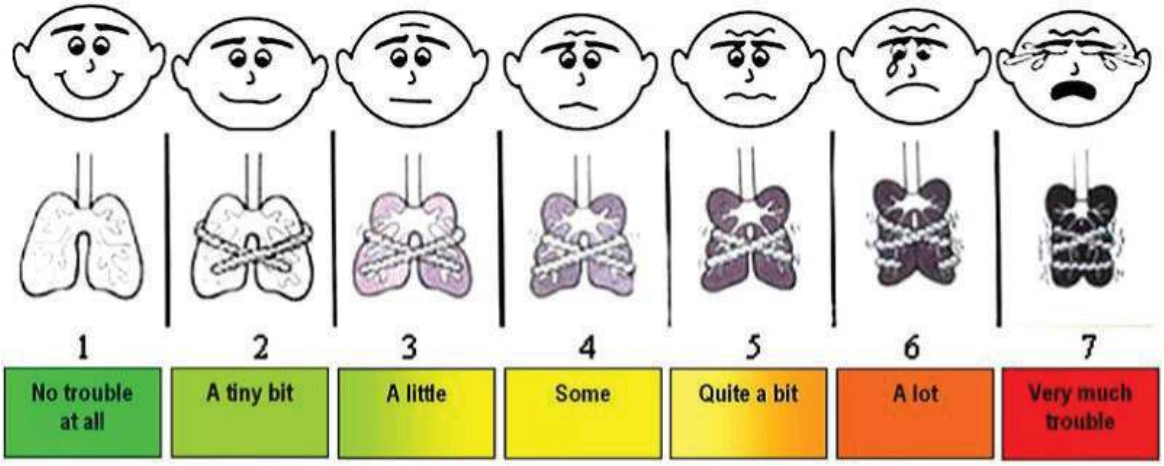
Clinical Characteristics[2]

- Dyspnea results from an imbalance between the metabolic needs of the body and the ability of the respiratory system to meet them.
- Respiratory rate or O2 saturation measurement may not correlate with the feeling of breathlessness. Breathing can be abnormal without being uncomfortable, or uncomfortable without being abnormal.
- Respiratory effort and dyspnea are not the same. For example, patients may experience relief of dyspnea from opioids without change in respiratory rate.
- Since dyspnea is a subjective sensation, self report is the most reliable indicator.

Assessment[1,3-4,6]

- Possible etiologies of dyspnea (Table 2)
- Disease progression
- History
  - Onset, duration
  - Precipitating and relieving factors
- Physical exam
  - Quality and depth of respirations
  - Character of lung sounds
  - Presence of stridor and/or obstructive noises
  - Presence of upper airway congestion
  - Respiratory effort (use of accessory muscles)
- Severity
  - In a nonverbal child, a visual analog scale can be used to assess dyspnea, similar to assessment of pain in such children. Patients should also be monitored for changes from baseline and signs of distress or anxiety.
  - Pediatric Dyspnea Scale (PDS)7 (Figure 1)
    - Preliminary validation in asthma patients aged 6 to 18
    - Patients are asked to answer the question "How much difficulty are you having breathing?" by choosing the column that best corresponds to his or her perceived symptoms.

Figure 1. Pediatric Dyspnea Scale[7]



- Observe the child during a respiratory exacerbation and assess for signs of distress or anxiety
  - Facial expressions, such as furrowed brow
  - Restlessness
  - Cyanosis
  - Increased work of breathing
  - Retractions
  - Grunting
  - Sweating
- Parent/caregivers coping abilities

Non-Pharmacological Treatment[1-2,4,6]

- Deep, slow breathing, singing, blowing bubbles or pinwheels, or breathing into a paper bag
- Improve air circulation/quality:
  - Provide a draft, using fans or open windows
    - Stimulates trigeminal nerve
  - Adjust temperature/humidity with air conditioner or humidifier
- Reposition to comfort, usually to a more upright position (30-90 degree incline)
- Self-hypnosis, or hypnosis directed by a professional skilled in hypnotherapy, or guided imagery
- Encourage relaxation
  - Calm, quiet environment
  - Reduce the need for exertion
  - Massage or therapeutic touch
  - Pet, water, or music therapy
- Minimize dyspnea triggers
  - Avoid strong odors, perfumes, and smoke
- Provide companionship (isolation and spiritual issues can worsen symptoms)
- Enlist interdisciplinary support (chaplain, social workers, counselors) to facilitate ongoing reassuring discussions regarding symptom meaning and medication use to alleviate fears and/or myths.
- Anticipate and proactively prepare the patient and family for worsening symptoms.

Pharmacotherapy[1-3,6,8]

Goals of treatment in pediatric patients are aimed at decreasing the perception of dyspnea. Immediate-release opioids and benzodiazepines are often first line therapy.

Oral & Parenteral Therapy

- Opioids suppress respiratory awareness, decrease response to hypoxia and hypercapnia, and have sedative properties. Opioids provide vasodilation in the lungs, therefore improving the ventilation/perfusion ratio in the lungs.
- Appropriately titrated, opioids have been shown to be safe and effective in the treatment of dyspnea. Titrate to minimal effective dose, often ¼- ½ of normal pain doses. In patients also receiving opioids for pain, total daily dose can be converted to a long-acting product with a short-acting agent available for dyspnea episodes.
- Benzodiazepines have a role if anxiety is significant, as they can provide additional and sustained anxiolytic properties.
- When using opioids, anticipate side effects and prevent constipation upon initiation of opioid.
- Methadone is not recommended for treatment of dyspnea. Interpatient variability in response to methadone may lead to respiratory depression or over sedation.
- In some cases, an underlying pathology can be established. Treatment should focus on reversing the cause of dyspnea (Table 2). Opioids may be used temporarily while these therapies take effect.

Medical Oxygen Therapy

- Oxygen therapy is well tolerated, relatively nonthreatening, and can reverse hypoxemia providing relief from dyspnea in some situations. However, oxygen is rarely beneficial in the active phase of dying.
- Noninvasive positive pressure ventilation can be useful to assist fatigued muscles and allow patients to take a deeper breath. Avoid initiating oxygen therapy at end of life.
- Oxygen masks may heighten anxiety due to a smothering effect, limit communication and eating. Evaluate goals of care. Family may want an unobstructed view of their child's face at end of life.
- Without hypoxemia, increased oxygen flow is more important than how the oxygen is delivered.

Nebulized Therapy

- If patient does not already use nebulized medications, evaluate benefit of nebulized therapy vs the increased complexity of care for the patient and family.
- Study results regarding nebulized opioids in the treatment of dyspnea have been inconsistent.[1]
  - Nonrandomized studies, case reports, and chart reviews describe anecdotal improvement in dyspnea using nebulized opioids.[10-12]
  - Several controlled studies using nebulized opioids have provided inconclusive or negative results.[13-15]
- Disadvantages of nebulized opioids compared to oral or other dosage forms include increased costs and a more complicated method of delivery. In patients with impaired alveolar surface or thick secretions (e.g., metastatic lung disease, cystic fibrosis), absorption will be limited, therefore decreasing effectiveness.
- Nebulized opioids may be advantageous in patients that are not able or willing to take an oral agent or cannot tolerate adverse effects.
  - FentaNYL appears to be the safest nebulized opioid. 10-13 FentaNYL is more lipophilic than morphine or hydromorphone which may contribute to higher systemic bioavailability and therefore more patient-reported benefit for dyspnea.[13-14]
  - Studies have not shown benefit with nebulized morphine or nebulized HYDROmorphone (Dilaudid®) versus nebulized saline.[10, 15]
- Nebulized furosemide appears effective for dyspnea refractory to other conventional therapies[16]
  - Hypothesized mechanism of action of nebulized furosemide is its ability to enhance pulmonary stretch receptor activity, inhibition of chloride movement through the membrane of the epithelial cell, and its ability to increase the synthesis of bronchodilating prostaglandins.

Table 2. Pharmacological Management of Dyspnea[17]

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Opioids			
HYDROmorphone (Dilaudid) C-II >6 months	**>6 months (10-50 kg):** 0.01-0.04 mg/kg Q4H PRN **>50 kg:** 0.5-1 mg Q3-4H PRN ▮ ¼ - ½ of normal analgesic dose	**PO** **SL** **PR** **IV** **SQ**	**Solution:** 1 mg/mL **Tablets:** 2, 4, 8 mg **Suppository:** 3 mg **Injection:** 0.2, 1, 2, 4, 10 mg/mL ▮ Tabs may be crushed for SL or given PR
	▮ Consider in patients with renal dysfunction		
Morphine (MSIR, Roxanol) C-II	**0.05-0.1 mg/kg Q4H PRN1** **Adult:** 2.5-5 mg Q4H PRN ▮ ¼ - ½ of normal analgesic dose	**PO** **SL** **PR** **SC** **IV**	**Solution (Roxanol):** 10 mg/5 mL; 20 mg/5 mL; **100 mg/5 mL** **Tablet (MSIR):** 15, 30 mg **Suppository:** 5, 10, 20, 30 mg **Injection:** 1, 2, 4, 5, 8, 10, 15, 25, 50 mg/mL **Injection [PF] 0.5, 1, 25 mg/mL** ▮ Administer IVP over at least 5 minutes ▮ Tabs may be crushed for SL or given PR
	▮ Drug of choice ▮ Infants <3 months more susceptible to respiratory depression ▮ Caution in renal impairment; glucuronide metabolite accumulation may cause neurotoxicity.		
oxyCODONE (Oxyfast, OxyIR, Roxicodone) C-II	**0.05-0.1 mg/kg Q4H PRN** **Max:** 10 mg **Adult:** 5 mg Q4H PRN ▮ ¼ - ½ of normal analgesic dose	**PO** **SL** **PR**	**Solution (Oxyfast):** 5 mg/5 mL; 100 mg/5 mL **Tablet (OxyIR, Roxicodone):** 5, 10, 15, 20, 30 mg ▮ Tabs may be crushed for SL or given PR
	▮ Consider in patients with renal dysfunction		
Benzodiazepines- Add if Anxiety present			
Diazepam (Valium) C-IV **PO:** >6 months **IM/IV:** >30 days **PR:** >2 yoa	**PO/SL/PR:** 0.12-0.8 mg/kg/day divided Q6-8H **Adult:** 2-10 mg Q6-8H or PRN **Max:** 60 mg/day **IM/IV:** 0.04-0.3 mg/kg/dose Q2-4H Max: 0.6 mg/kg within 8-hr	**PO** **SL** **PR** **IM** **IV**	**Solution:** 5 mg/5 mL; 5 mg/mL **Tablet:** 2, 5, 10 mg **Injection:** 5 mg/mL ▮ Tabs may be crushed for SL or given PR ▮ Dilute injection & administer at a rate NTE 2 mg/min. Injection contains benzyl alcohol.
	▮ Use cautiously in neonates; more susceptible to respiratory depression ▮ Short duration due to rapid redistribution into peripheral tissues ▮ Active metabolite can accumulate in patients with renal insufficiency ▮ Monitor for extravasation with IV use		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
LORazepam (Ativan) C-IV	**0.05 mg/kg Q4H PRN** **Max:** 2 mg **Adult:** 0.5-1 mg Q4-6H or PRN **Max:** 10 mg/day	**PO** **SL** **PR** **SC** **IV**	**Solution:** 2 mg/mL **Tablets:** 0.5, 1, 2 mg **Injection:** 2, 4 mg/mL ▮ May be given SL or PR ▮ Oral solution and injection contain propylene glycol, benzyl alcohol and propylene glycol ▮ Dilute 1:1 with NS & give IV over 2-5 min
	▮ Drug of choice ▮ Paradoxical reactions more common in children ▮ May administer with food to decrease GI distress ▮ May dilute oral solution in water, juice, soda, or semisolid food		
Nebulized Medications			
Albuterol (AccuNeb)	**10-15 kg:** 1.25 mg **>15 kg:** 2.5 mg **Adult:** 2.5-5 mg Q4H PRN	**Inh**	**Solution, nebulization:** 0.083% [2.5 mg/3 mL]; 0.021% [0.63 mg/3 mL]; 0.042% [1.25 mg/3 mL]; 0.5% [2.5 mg/0.5 mL] ▮ Discard vial 1 week after removed from foil
	▮ Discontinue if paradoxical bronchospasm ▮ Avoid caffeine due to increased side effects of albuterol ▮ ↑side effects and ↓ efficacy seen with oral forms		
Levalbuterol	**≤4 yoa:** 0.31 – 1.25 mg Q4-6H PRN **5-12 yoa:** 0.31 – 0.63 mg Q8H PRN **≥12 yoa:** 0.63 – 1.25 mg Q6-8H PRN	**Inh**	**Solution, nebulization:** 0.31 mg/3 mL, 0.63 mg/3 mL, 1.25 mg/0.5 mL, 1.25 mg/3 mL
	▮ Reserved for patients unable to tolerate albuterol ▮ SE: headache, vomiting, viral infection, rhinitis, tachycardia		
FentaNYL, nebulized (Sublimaze) C-II	**25 mcg Q2-4H** **Adult:** 25-50 mcg Q2-4H **Max:** 100 mcg/dose	**Inh**	**Injection [PF]:** 0.05 mg/mL ▮ Dilute injectable with 2 mL 0.9% NS & administer via nebulizer
	▮ Study results inconsistent10-13; reserve for refractory dyspnea		
Furosemide (Lasix)	**1-2 mg/kg diluted in 2 mL NS** **Adult:** 20 mg nebulized QID	**Inh**	**Injection [PF]:** 10 mg/mL ▮ Dilute injectable with 2 mL 0.9% NS & administer via nebulizer
	▮ May cause photosensitivity reactions ▮ Minimal systemic absorption, little effect on diuresis		
Saline, nebulized ★	**3 mL (1 vial) with nebulizer Q4-6H**	**Inh**	**Solution, nebulization:** 0.9%
	▮ Stimulates trigeminal nerve ▮ Thins secretions		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Corticosteroids			
Dexamethasone (Decadron)	**0.08-0.3 mg/kg divided Q6-24H** **Adult:** 0.75-9 mg divided Q6-24H	**PO** **PR** **IM** **IV**	**Solution, Elixir:** 0.5 mg/5 mL (5% EtOH), 0.5 mg/0.5 mL (30% EtOH) **Tablets:** 0.5, 0.75, 1, 1.5, 2, 4 mg **Injection:** 10, 25, 50 mg/mL ▮ Oral solutions and elixirs contain alcohol, propylene glycol, and benzoic acid. May Use IV formulation orally (10 mg/mL PF).
	▮ Give with food or milk to decrease GI disturbances ▮ Avoid administering later in the day due to insomnia ▮ Minimal mineralocorticoid activity ▮ Withdraw gradually after long-term therapy ▮ SE: adrenal suppression, Cushing's syndrome, hyperglycemia, growth suppression, GI bleed, insomnia, hypertension, myopathy, mood alterations		
PrednisoLONE (Orapred)	**0.1-2 mg/kg/day divided Q6-24H** **Adult:** 5-60 mg/day	**PO**	**Solution:** 5 mg/5 mL; 10 mg/5 mL; 15 mg/5 mL; 20 mg/5 mL; 25 mg/5 mL **Tablet:** 5 mg **Tablet, ODT:** 10, 15, 30 mg ▮ Solution may contain sodium benzoate or alcohol
	▮ Withdraw gradually after long-term therapy ▮ Give with food or milk to decrease GI disturbances ▮ Avoid giving later in the day due to insomnia ▮ SE: adrenal suppression, Cushing's syndrome, hyperglycemia, immunosuppression, growth suppression, GI bleed, insomnia, hypertension, myopathy, fluid retention, mood alterations		
PredniSONE (Deltasone)	**0. 5-2 mg/kg/day** **Max:** 60 mg/day **Adult:** 5-60 mg/day	**PO**	**Solution:** 1 mg/mL **Solution:** 5 mg/mL (30% EtOH) **Tablets:** 1, 2.5, 5, 10, 20, 50 mg ▮ Concentrate contains propylene glycol
	▮ Give with food or milk to decrease GI disturbances ▮ Avoid administering later in the day due to insomnia ▮ SE: adrenal suppression, Cushing's syndrome, hyperglycemia, growth suppression, GI bleed, insomnia, hypertension, myopathy, fluid retention, mood alterations		

**Use cautiously in patients outside of FDA & manufacturer recommended age parameters. **Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

Excerpted from Hunt MO, Protus BM, Winters JP, Parker DC. Pediatric Palliative Care Consultant: Guidelines for Effective Management of Symptoms. Montgomery, Al: HospiScript; c2014. p. 109-116.

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Autonomic Dysfunction & Seizures

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Autonomic dysfunction (Dysautonomia): As a progressive neurological disorder with varying etiology and affecting multiple bodily systems, dysautonomia is often associated with other conditions. A functional therapies program, such as physical therapy, is typically utilized to activate the nervous system and prompt healing although not being curative. In creating a plan of care with the multidisciplinary team, CCLS would advocate for multiple sessions to provide medical teaching and address relevant physical symptoms, with a strong focus on expressive interventions and activities supporting the physical therapeutic goals of team members. Breaking down aspects of the condition pertinent to the child, a Child Life Specialist increases understanding by transforming difficult medical jargon into suitable terminology through medical play. Utilizing toy figures and medical materials, difficult emotions can be played out as children and adolescents do not have the necessary vocabulary or may be fearful to express their emotions. Each child, as a patient, sibling, or child of an adult patient can benefit from interactions with a CCLS, as a child life plan of care is inclusive of the patient's family members.

Seizures occur unexpectedly, in significantly differing patterns of physical and mental states. Preventative measures primarily include prescribed medications and avoiding triggers. Employing the patient or family members to note any incidents which may precede the onset of symptoms—which may include, but are not limited to, sleep deprivation, intake of specific food and beverages, flashing lights, stress or pre-seizure auras, oral or auditory sensations, or visualization of intense light. Supporting children and adolescents presenting with seizures involves emotional support post event, as seizures are a physical anomaly of electrical activity in the brain. Emotional responses to a seizure may include fear, frustration, embarrassment, or anger. Child Life Specialists address the child's specific response through guided therapeutic play to work through their feelings and gain skills to counter their responses to the unpredictable event.

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Seizures: Child life support for seizures is best viewed through an educational lens. Providing developmentally-appropriate explanations of what a seizure is and ensuring that a child has no misconceptions regarding its causality. Child Life Specialists also provide support to siblings in offering education and support regarding this symptom, as it can be distressing to witness someone else experiencing a seizure.

Autonomic Dysfunction & Seizures

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- Musical entrainment, or also called iso-principle technique: used to increase sense of relaxation by entraining the patient to, and then systematically manipulating, musical parameters (i.e., tempo, dynamics, rhythmic complexity, melodic complexity, harmonic complexity) across the session. Once entrained, the musical parameters are then changed to decreasing complexity to alter behavioral and physiologic indicators (e.g. activity level, mood and affect presentation, and respiration rate) to either maintain or achieve a more relaxed state (Millett & Gooding, 2017).
- At times music therapy can be contraindicated with patients with seizures, music therapist to approach cautiously and observe for signs.
- American Music Therapy Association Fact Sheet Music Therapy in Pediatric Medical Care: https://www.musictherapy.org/assets/1/7/FactSheet_Music_Therapy_in_Pediatric_Medical_Care_2021.pdf

Seizures (MUSIC)

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There is an important consideration that comes into play with individuals who experience seizures, whether it be through a seizure disorder or as a symptom of another disease process: sensory stimulation. It is important to recognize that even preferred activities can be over-stimulating or have potential for harm as the brain is processing information. Additionally, the music therapist may assess and/or collaborate with the medical staff to review if there is any sensitivity to tactile vs auditory stimulation. Although music can be inherently relaxing, it can also provide the potential for overstimulation. Board-certified music therapists have the training and education needed to recognize where the stimulation threshold is for an individual and alter the approach to avoid harm. This may mean that certain tones or frequencies must be avoided or that the length of time music is offered must be altered. In many populations, the ongoing use of pre-recorded music can be overstimulating and cause a myriad of negative responses, inclusive of seizures, agitation, and distress. The implementation of safe practices by music therapists and other expressive art therapies is essential to maintain well-being for the individual, regardless of age.

Symptom: Chemotherapy-Induced Peripheral Neuropathy

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Massage therapy protocol for hands and/or feet (about 15 minutes)

Pressure and strokes: All strokes are provided at a pressure level of no more than "heavy lotioning"; deep pressure is not necessary. Use shorter strokes of an inch or so in areas of neuropathy symptoms and longer strokes beyond those areas.

Begin with a thorough examination of the recipient's hands and/or feet. Look for broken skin and check in about comfort and pressure (about 30 sec. per extremity). If there is any broken skin or skin sensitive to touch, avoid those areas.

Lightly apply lotion or cream to the foot and leg or hand and arm with a slow, gentle stroke toward the head. Work all the way to the knee or elbow being sure to address all surfaces (about 60 sec. per extremity).

Massage all "sides" of each toe or finger (imagine that there are 4 sides; top, bottom, side, side) using short gliding strokes from the tip of the toes toward the foot/fingers toward the hand. Do not pull back toward the tips of toes or fingers. All strokes should be toward the heart for maximum effect. It is not dangerous to pull back toward the tips of the toes or fingers, but it may lessen the impact of the protocol (about 2.5 min. per extremity).

Continue to massage toes or fingers, ball and arch of foot, or palm of hand, and the heel of the foot or hand with the same, short, gliding strokes (about 2.5 min. per extremity).

Address the foot or hand from the base of the toes or fingers and work toward the ankle or wrist with gliding strokes (only an inch or so in areas of neuropathy), that go toward the heart. Massage the whole foot and ankle (both top and bottom), and front and back of the lower leg up to the knee. Massage the whole hand and wrist (both top and bottom), and front and back of the lower arm up to the elbow. All strokes continue to orient toward the heart (about 5 min. per extremity).

End your work with each extremity with gentle, slow, and longer strokes from the toes/fingers to the knee/elbow (about 60 sec. per extremity).

Seizures

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Introduction and Background[1-3]

- Seizures are caused by a brief, excessive surge of electrical activity in the brain. This surge causes changes in sensations, perceptions, and/or behaviors and is typically brief (lasting less than 5 minutes).
- The propagation of seizures occurs differently in the brain of a neonate and young infant as compared to an adult brain, making a child's brain more prone to seizure activity.
- Once a child reaches six years of age, seizure activity is similar to that of an adult.
- Seizures can manifest in a number of ways, not just in tonic-clonic muscle activity (convulsions).
  - Neonates and infants express behaviors more fragmented and less complicated during seizure activity as compared to older children.
- Most seizures can be sorted into two groups: focal seizures and generalized seizures.[4]
  - Focal seizures result from an abnormal electrical discharge restricted to one part of the brain (or a localized region of the brain). Focal seizures were formerly referred to as partial seizures.
  - Generalized seizures are the result of a widespread, excessive electrical discharge simultaneously involving both sides of the brain.
  - This distinction is not absolute, since an initially focal seizure can spread and become generalized.

Prevalence

- Many children with a primary neurologic illness who require end-of-life care experience chronic seizures.
- The true prevalence of emergent seizures in the hospice setting is not well documented.
- Seizures are a frequent symptom in patients with brain tumors or metastases.[5]
- Simple febrile seizures are common in the general population and may occur at end of life as well.

Causes[1, 5-6]

- The etiology of childhood seizures is somewhat age-dependent in the general pediatric population:
  - In neonates, asphyxia, trauma, congenital disorders, drug withdrawal, familial seizures, hereditary or metabolic diseases, inborn errors of metabolism, infections, intracranial hemorrhage, and pyridoxine dependency are possible causes.
  - Seizures in infancy, childhood, and adolescence can be attributed to central nervous system infections, degenerative disorders, drugs or drug withdrawal, hereditary diseases, idiopathic epilepsy, trauma, and/or tumors.
- Many children who require end-of-life care experience seizures as a:
  - Part of a primary neurologic illness
  - Part of an overwhelming systemic illness (chronic or acute)
  - Metabolic derangement (e.g. hypo/hypernatremia, hypoglycemia, hypocalcemia, hypomagnesemia, uremia, multi-system failure)
  - Reflection of disease progression (e.g. cerebral metastases)

Table 1. Potential Causes of Increased Seizure Activity[7-8]

Change in seizure management	Infection or fever
Medications (interactions, inappropriate levels, decreased seizure threshold)	Renal failure
Hepatic failure	Sleep deprivation
Hypoxia	Stroke
Increased intracranial pressure, head trauma	Withdrawal (alcohol or drugs)

Table 2. Conditions that can Mimic Seizures in Children[2]

Anxiety	Gastroesophageal reflux
Behavioral events (e.g. tantrums, daydreaming)	Syncope (e.g. breath holding, vasovagal syncope, arrhythmias)
Complicated migraine	Tics or other dyskinesias
Conversion disorders	Transient ischemic attacks
Delirium	Stroke

Clinical Characteristics[2-4]

- In a generalized, tonic-clonic seizure, the patient first becomes stiff; often uttering a cry, then loses consciousness and falls.
  - The cry results from air being forced through contracted vocal cords.
  - After this initial period of muscle stiffness, the patient's arms and legs jerk rhythmically.
  - Patients may drool, bite their tongues, or lose control of bowel or bladder during a seizure.
- The entire process ("ictal" stage of a seizure) usually lasts from 1 to 3 minutes. Afterwards, the person usually appears drowsy, confused, or may even fall asleep ("post-ictal" stage).
- Not every seizure manifests with convulsions. Table 3 describes some common pediatric seizure types.
- Focal seizures can produce troublesome and treatment refractory problems, such as episodic focal pain, paresthesia, confusion, or gastrointestinal symptoms, and can mimic psychiatric syndromes.
- Status epilepticus is a special condition of prolonged seizure activity and is generally considered a medical emergency. Traditionally, status epilepticus is defined as a seizure lasting longer than 30 minutes or seizures recurring without return of consciousness between seizures. However, seizures lasting longer than 5 minutes are unlikely to self-terminate and may cause neuronal injury.

Assessment[2,9]

- Assess airway, breathing, and circulation. Check rapid glucose level if appropriate.
- Examine patient from head to toe for causes or injuries associated with seizure activity.
- Confirm the events are seizures. Many conditions can mimic seizures in children (Table 2).
- Evaluate clinical features of the episode: focal onset (aura, twitching, posturing, sensory phenomena), degree of responsiveness during the episode, duration, and manifestations of postictal state.
- Laboratory studies may be required to detect the cause of a new onset seizure in hospice, since infectious or metabolic causes are likely.
- Electroencephalography (EEG) is the standard diagnostic test for seizures and epilepsy. In many cases, the EEG shows a widespread increase in electrical activity. However, the EEG may be normal in between seizure episodes. An EEG must be interpreted by an expert experienced in the diagnosis of seizures.

- Determine frequency of seizures and their impact on physical health (injuries and hospitalizations) and psychosocial well-being (embarrassment, anxiety, etc).
  - Determine if occasional seizures are better tolerated than the sedative effects of multiple antiepileptic agents (AEDs) or vice versa.
  - Discuss acceptable/achievable goals with the family.
- Evaluate medication profile for any recent medication changes, possible drug interactions, and medications that decrease the seizure threshold (e.g., traMADol, chlorproMAZINE, diphenydrAMINE).

Non-Pharmacological Treatment[2,5-6,9-12]

- When a patient is having a generalized seizure, make sure they are not in a position from which they could fall and be injured.
- Gently move the patient to a stable position (lying down) and place the patient on one side to minimize the risk of aspiration.
- Do not insert anything into the patient's mouth.
- Jaw thrust maneuver may help open the airway.
- Assess the patient's airway, breathing, and circulation during recovery from the seizure, recognizing that at the peak of convulsive activity there may be a brief period of apnea and asystole.
- Monitor to ensure the seizure resolves into a post-ictal phase (cessation of seizure with somnolence), which should occur in a matter of seconds to a few minutes.
- Administer glucose (orally or parenterally), if available and appropriate.
- Once seizures are controlled, search for and correct underlying abnormalities.
- Educate the patient and family about seizure precautions, what to expect, how to manage seizures if they recur, and possible ways to minimize seizure episodes if there is an underlying cause.

Pharmacotherapy[1-2,5,7-8,13-15]

- For patients with pre-existing seizure disorders, continue the patient's current AED medication, as long as it is effective in controlling seizures.
- Empiric therapy should be initiated based on the patient's diagnosis, seizure type, and age. AED choice should be a first line agent for the seizure type (Table 4). Consider compliance, side effects, and potential drug interactions when choosing therapy.
- Initially, one medication should be initiated, dose titrated gradually until seizure control or side effects occur. Monotherapy is preferred in most situations due to the potential for increased side effects and drug interactions (Table 5).16 Although, many patients have treatment failure with the first AED chosen, either due to side effects or lack of efficacy.17
- A second medication should be added if seizure control cannot be achieved with one medication alone. Ideally, this will also be a first line agent for seizure type.
- Second line agents should be considered if
  - All first line agents have been tried or
  - Other first line options are inappropriate (age restrictions, side effects, or other conditions) or
  - A second line agent would be more appropriate due to a mixed seizure type
- Some AEDs used in certain epilepsies may worsen seizures. These agents would be considered unacceptable for these seizure types (Table 4).18
- Patients should be monitored carefully for an increase in seizure activity when new AEDs are added. If this occurs, the new agent should be tapered.
- Consider benefits versus side effects of treatment carefully in each patient situation (Table 6). For example, many AEDs affect body weight, this effect may be beneficial or detrimental depending on the patient.

- Dosage changes should be made gradually based on the specific medication. Dose should be recalculated regularly based on patient weight as patient grows. Neonates metabolize AEDs slowly because of immature oxidative pathways and usually need lower mg/kg/day doses. Children metabolize AEDs more rapidly than adults and may need higher mg/kg/day doses.
- When discontinuing a maintenance dose of an AED, slow taper to discontinuation minimizes the risk of withdrawal seizures. Patients and families should be advised against stopping AEDs abruptly for the same reason.
- As the patient declines, or swallowing difficulty develops, medications should be reviewed and changed to appropriate alternative agents (Table 7).
- LORazepam (Ativan) and PHENobarbital are considered drugs of choice for managing seizures in patients who are actively declining.

Drug and Food Interactions

- Many AEDs are inducers of cytochrome P-450 enzyme systems that are metabolic pathways for AEDs. Enzyme induction may result in drug interactions between AEDs that are commonly used concurrently (Table 5), as well as other medications (see Drugs Affected by Cytochrome P450 Enzyme Metabolism). Patients should be monitored for potential drug interactions.
- Some interactions may require dose adjustments or increased monitoring of drug levels. LamoTRIgine, for example, has specific initial dosing recommendations based on the other enzyme inducing agents the patient is receiving.
- If specific recommendations are not available, monitor for possible effects of the interaction, such as increased side effects or seizure activity, and adjust if needed.
- For patients with an enteral feeding tube, utilization of this route of administration is possible, although medication characteristics should be taken into account, such as site of absorption, possible interaction with feeds, or adherence to tubing.[19]

Table 3. Description of Seizure Types[2,4]

Seizure Type	Ages	Description	Comments
Focal			
Focal	Any	▮ Abnormal electrical discharge restricted to one part of the brain ▮ With or without impairment of consciousness	▮ Formerly referred to as partial seizures ▮ Usually last <2 minutes ▮ Types include: motor, sensory, autonomic, & psychic
Benign Rolandic	3 – 11 years	▮ Rhythmic twitching of the mouth ▮ Predominance during sleep ▮ No serious underlying structural brain disorder	▮ Medications can be withdrawn after 1-2 years of control ▮ Most patients have spontaneous remission by 16-18 years of age ▮ Most common type of focal seizures
Generalized			
Absence	4-14 years	▮ Brief staring spell (3-30 seconds), with cessation of activity ▮ May include eye fluttering, mild lip movements, or twitches ▮ No postictal phase	▮ Simple – no loss of body tone ▮ Complex – loss of body tone ▮ Types include: typical, atypical, & special features (myoclonic, eyelid) ▮ 50% spontaneous remission; 50% progress to juvenile myoclonic

Seizure Type	Ages	Description	Comments
Atonic	Any	▮ Brief lapse in muscle tone, usually lasting <15 seconds ▮ Consciousness is usually preserved	▮ Also known as drop seizures, akinetic seizures, or drop attacks ▮ Caused by temporary alterations in brain function
Clonic	Rare	▮ Rhythmic jerking movements of the arms and legs	▮ May involve both sides of the body and length varies
Tonic	Any	▮ Continuous stiffening of the extremities, affecting both sides ▮ Consciousness is usually preserved	▮ Usually last < 20 seconds ▮ Often occur during sleep
Tonic-Clonic	Any	▮ Tonic refers to continuous stiffening of the extremities ▮ Clonic refers to the rhythmic alternating contraction and relaxation of the muscles ▮ Begins with continuous tonic stiffening; followed by rhythmic jerks	▮ Air forced past the vocal cords causes a cry or groan ▮ Loss of consciousness & bladder control ▮ Followed by postictal phase involving confusion, fatigue, headaches, muscle aches and no memory of the seizure event
Juvenile Myoclonic	7 – 18 years	▮ Sudden, brief muscle jerks ▮ Last only a few seconds, but involve both sides of the body ▮ Typically occur in the morning	▮ Triggers: alcohol, sleep deprivation, lights, menstruation ▮ Well controlled with medication, but require lifelong treatment ▮ Types include: myoclonic, myoclonic atonic, & myoclonic tonic
Lennox Gastaut	Peak onset: 3 – 5 years	▮ Multiple seizure types ▮ Distinctive brain-wave pattern ▮ Mental deficiency	▮ Daily seizures, usually repeated multiple times throughout day ▮ Management difficult, involving multiple medications ▮ Remission is rare
Unknown			
Epileptic Spasms (including infantile)	2 – 12 months	▮ Myoclonic type seizures ▮ Clustered bouts of 3-6 myoclonic jerks, momentary loss of tone, or as clusters of forceful extension or flexion of the head, legs, and trunk	▮ Caused by overproduction of corticotropin releasing hormone ▮ Also referred to as West Syndrome ▮ EEG finding of hypsarrhythmia
Febrile	6 months – 6 years	▮ Convulsion triggered by fever ▮ Loss of consciousness, but eyes typically remain open	▮ Simple: lasting < 5 min (97%) ▮ Complex: lasting longer than 10-20 min

Table 4. Treatment Options Based on Seizure Type[1, 14-15, 18, 20]

Seizure Type	First Line	Second Line	Unacceptable
Focal			
Focal	levETIRAcetam carBAMazepine phenytoin valproic acid	▮ gabapentin ▮ lamoTRIgine ▮ felbamate ▮ PHENobarbital ▮ tiaGABine ▮ topiramate ▮ vigabatrin ▮ OXcarbazepine zonisamide	▮ felbamate (alone) ▮ ethosuximide
Generalized			
Absence	ethosuximide valproic acid	▮ lamoTRIgine ▮ levETIRAcetam ▮ zonisamide ▮ PHENobarbital ▮ primidone ▮ acetaZOLAMIDE	▮ carBAMazepine gabapentin ▮ vigabatrin ▮ OXcarbazepine ▮ topiramate ▮ felbamate ▮ tiaGABine[1]
Atonic	valproic acid	▮ lamoTRIgine ▮ topiramate ▮ felbamate	▮ carBAMazepine OXcarbazepine ▮ ethosuximide
Tonic	valproic acid carBAMazepine	▮ OXcarbazepine lamoTRIgine ▮ phenytoin ▮ PHENobarbital vigabatrin ▮ tiagabine ▮ topiramate	▮ felbamate (alone) ▮ ethosuximide
Tonic-Clonic	phenytoin valproic acid carBAMazepine levETIRAcetam	▮ PHENobarbital lamoTRIgine ▮ topiramate ▮ zonisamide	▮ felbamate (alone) ▮ ethosuximide
Myoclonic	valproic acid levETIRAcetam	▮ topiramate ▮ zonisamide ▮ acetaZOLAMIDE ▮ lamoTRIgine	▮ carBAMazepine[21] ▮ phenytoin[21] ▮ felbamate OXcarbazepine ▮ pregabalin[22] ▮ tiaGABine[1]
Lennox-Gastaut	valproic acid lamoTRIgine topiramate	▮ clobazam ▮ zonisamide ▮ felbamate ▮ rufinamide	▮ ethosuximide ▮ gabapentin ▮ vigabatrin
Unknown			
Epileptic Spasms (including infantile)	corticotropin	▮ valproic acid ▮ zonisamide	

Table 5. Common Antiepileptic Drug Interactions‡[23]

Medication	Drug Added	Effect	Adjustment‡
carBAMazepine	OXcarbazepine	↓ OXcarbazepine	↑ OXcarbazepine dose
	felbamate phenytoin ethosuximide PHENobarbital primidone	↓ carBAMazepine	↓ carBAMazepine dose by 20% Consider therapy modification. Monitor levels. Monitor for effects of interaction & adjust as needed
	valproic acid	↑ carBAMazepine	
ethosuximide	carBAMazepine PHENobarbital	↓ ethosuximide	Monitor for effects of interaction & adjust as needed
	phenytoin	↑ phenytoin	
	valproic acid	↑ethosuximide	
felbamate	PHENobarbital phenytoin primidone	↓ felbamate	Monitor for effects of interaction & adjust as needed ↓ PHENobarbital dose by 20%. Monitor levels. ↓ phenytoin dose by 20%. Monitor levels ↓ primidone dose by 20%
	valproic acid	↑ felbamate	Consider therapy modification
lamoTRIgine	carBAMazepine PHENobarbital phenytoin primidone	↓lamoTRIgine	Consider therapy modification. Patient specific dose dependent on other enzyme-inducing agents patient is receiving; see specific dosing recommendations.
	valproic acid	↑ lamoTRIgine	
OXcarbazepine	phenytoin	↑ phenytoin	Consider therapy modification. ↑ OXcarbazepine dose
PHENobarbital	felbamate OXcarbazepine valproic acid	↑ PHENobarbital	↓ PHENobarbital dose by 20%. Monitor levels. Consider therapy modification. ↑ OXcarbazepine dose
	phenytoin	↑ or ↓ PHENobarbital	Monitor for effects of interaction & adjust as needed
	zonisamide	↓ zonisamide	
phenytoin	felbamate	↑ phenytoin	↓ phenytoin dose by 20%. Monitor levels.
	carBAMazepine vigabatrin	↓ phenytoin	Monitor for effects of interaction & adjust as needed
	PHENobarbital	↓ or ↑ phenytoin	
	valproic acid	↓ phenytoin total, increased free	
	zonisamide	↓ zonisamide	
primidone	carBAMazepine phenytoin	↓ primidone (& ↑ PHENobarbital)§	Monitor for effects of interaction & adjust as needed
	valproic acid	↑ primidone (& ↑ PHENobarbital)§	

Medication	Drug Added	Effect	Adjustment‡
tiaGABine	▮ carBAMazepine ▮ phenytoin ▮ PHENobarbital	↓ tiagabine	Monitor for effects of interaction & adjust as needed
topiramate	▮ carBAMazepine ▮ phenytoin ▮ valproic acid	↓ topiramate	Monitor for effects of interaction & adjust as needed
valproic acid	▮ carBAMazepine ▮ lamoTRIgine ▮ primidone ▮ phenytoin ▮ PHENobarbital	↓ valproic acid	Monitor for effects of interaction & adjust as needed
zonisamide	▮ PHENobarbital carBAMazepine ▮ phenytoin	↓ zonisamide	Monitor for effects of interaction & adjust as needed

‡Common interactions included, not all inclusive. Monitor for potential drug-drug interactions with AEDs and make adjustments as needed.

§PHENobarbital is one of the active metabolites of primidone. CarBAMazepine and primidone are affected by a complicated CYP interaction. Phenytoin increases the metabolism of primidone, therefore resulting in increased PHENobarbital levels. Valproic acid inhibits the metabolism of both primidone and PHENobarbital.

Table 6. Common Side Effects of AEDs[1, 14-15,23]

AED	Cognitive Effects	Risk of Rash	Weight Change	Constipation	Other
carBAMazepine	Sedation, dizziness	High	↑	10%	Aplastic anemia, hepatic failure, agranulocytosis
felbamate	Dizziness, hyperactivity	Purpura	↓	7-11%	Liver & hematologic toxicity
gabapentin	Aggression, hyperactivity	Low	↑	1-4%	
lacosamide	Dizziness, fatigue	-	-	-	PR interval prolongation, ataxia
lamoTRIgine	Headache, dizziness	High	↑ (minor)	5%	Stevens-Johnson syndrome, ataxia, tremor
levETIRAcetam	Behavioral changes, somnolence	Low	-	3%	Irritability, hostility
OXcarbazepine	Somnolence, dizziness	High	↑ (minor)	2-6%	Hyponatremia
PHENobarbital	Neurotoxicity, mood fluctuations, aggression	High	-	+	Liver toxicity
phenytoin	Fatigue, dizziness	High	-	+	Gingival hyperplasia, ataxia
pregabalin	Fatigue, dizziness	-	↑	<10%	Ataxia
primidone	Dizziness, slurred speech, drowsiness	High	-	-	Liver toxicity
rufinamide	Somnolence	Low	↓ (minor)	3%	Shortened QT interval

AED	Cognitive Effects	Risk of Rash	Weight Change	Constipation	Other
tiaGABine	Dizziness, somnolence, headache	Low	↑	-	Precipitation of absence, myoclonic & nonconvulsive
topiramate	Difficulty with word finding & concentration, drowsiness	Low	↓	4-5%	Paresthesias, oligohydrosis, nephrolithiasis, metabolic acidosis, ataxia
valproic acid	Drowsiness	Low	↑	-	Hepatic failure, aplastic anemia, pancreatitis, ataxia
vigabatrin	Somnolence, dizziness, irritability	High	↑	6-14%	Vision loss, upper respiratory infection
zonisamide	Drowsiness, difficulty concentrating	High	↓	2%	Aplastic anemia, oligohydrosis, nephrolithiasis, ataxia

Table 7. Treatment Options when Oral Route is No Longer Appropriate†[23-24]

Rectal	Sublingual / Buccal	Parenteral	Oral ONLY
carBAMazepine 1:1 IR tablets, suspension	**lamoTRIgine** ODT	**FOSphenytoin** IV, IM	**ethosuximide**
lamoTRIgine 2:1 Tablets	**clonazepam** ODT	**lacosamide** IV	**felbamate**
levETIRAcetam[8] 1:1 Liquid, IR tablets *If only option*	**diazepam** Tablets *(crushed)*	**levETIRAcetam** IV	**gabapentin**
PHENobarbital 1:1 Injection, elixir *(consider volume)*	**LORazepam** Tablets *(crushed)*	**PHENobarbital** IV, SQ, IM	**OXcarbamazepine**
topirimate 1:1 Tablets	**midazolam**[25-27] Injection	**valproic acid** IV (q6h)	**phenytoin**
valproic acid 1:1 Liquid (dilute) *Do not use EC/ER*	**dexamethasone** Tumor	**diazepam** IV, IM *(poor)*	**pregabalin**
clonazepam 1:1 Tablets		**LORazepam** IV, SQ, IM	**primidone**
diazepam PR Tablets, liquid, injection, gel		**midazolam** IV, SQ, IM	**rufinamide**
LORazepam 1:1 Tablets, liquid		**dexamethasone** IV, SQ	**tiaGABine**
dexamethasone 1:1 Tumor seizures Rectal irritation			**vigabatrin**
			zonisamide

†Patient's age and seizure type should be taken into consideration when choosing therapy

Acute Seizure Management[2,7,9-10]

- For acute seizures, IV access is helpful, since it allows more rapid control of seizures. However, if access is unavailable, rectal or sublingual/buccal administration of benzodiazepines is effective in controlling acute seizures. Sublingual/buccal administration may be convenient, provide parent satisfaction, require less time for administration, and have quicker onset of action. [25-27]
- Midazolam (Versed) and LORazepam (Ativan) have also been administered intranasally, using an atomizer medication delivery device.[28-31] Administration via feeding tube would be last line for acute management of seizures due to the delayed time to peak concentration.
- Benzodiazepines are first line for acute seizure management. Patients on chronic benzodiazepines may need higher doses for acute treatment.
- Benzodiazepine doses can be repeated every 5-10 minutes until seizures subside (depending on agent and route) (Table 8). If seizure persists despite three benzodiazepine doses, consider other agents (Table 9).
- Benzodiazepines are less effective for atypical absence status, although still the drug of choice, and have been associated with the precipitation of tonic status.

General Benzodiazepine Considerations[23]

- Little clinical evidence exists to suggest that one benzodiazepine is more effective than another.
- Benzodiazepines have the same mechanisms of action. Major differences are reflected only in their pharmacokinetic profile, relative cost, and patient preference.
- Most clinicians consider LORazepam the benzodiazepine of choice for acute seizure treatment, since it has no active metabolites, maintains CNS penetration, and has a relatively short half-life.
- There is rarely rationale for using more than one benzodiazepine at the same time. One exception may be in a patient receiving a long acting benzodiazepine for spasticity, as well as a short acting benzodiazepine as needed for acute seizure management.
- Common adverse reactions include hypotension, bradycardia, confusion, combativeness, nausea/vomiting, headache, myoclonic jerking (especially in neonates), and drowsiness.
- Benzodiazepines can cause respiratory depression (U.S. boxed warning), especially in combination with other CNS depressants.
- A reversal agent is available, flumazenil (Romazicon) [dose: 0.01mg/kg IV (Max: 2 mg/dose)], which can be repeated every minute as needed. Flumazenil may precipitate seizures (U.S. boxed warning).
- Paradoxical reactions to benzodiazepines occur more commonly in children than in adults.
- Tolerance can develop to benzodiazepines with long term usage. Sudden cessation with long-term use can result in withdrawal.
- Benzodiazepines provide amnesia and anxiolysis, but do not provide analgesic effects.
- Monitor for potential drug interactions with CYP450 isoenzymes and substrates (See Drugs Affected by Cytochrome P450 Enzyme Metabolism).

Table 8. Benzodiazepine Pharmacological Comparison[8,23]

Medication	Typical Starting Dose**	Pediatric Formulation Considerations	Routes	Onset (min)	Peak (hr)	t½ (hr)
LORazepam (Ativan)	**PO:** 0.02-0.05 mg/kg **IV/IN:** 0.05-0.1 mg/kg 30-31 **Adult:** 2 mg/dose **Max:** 4 mg/dose	**Solution:** 2 mg/mL **Tablets:** 0.5, 1, 2 mg **Injection:** 2, 4 mg/mL	**PO** **SL** **PR** **IM** *(poor)* **IV**	**PO:** 30-90 **PR:** 2-10 **IV:** 1-3	**PO:** 1-1.5 **PR:** 1.5	6-17
	▮ Well absorbed SL and PR; tabs may be crushed ▮ Injection may be given rectally ▮ Solution & injection contain propylene glycol & benzyl alcohol ▮ Dilute 1:1 with NS & give IV over 2-5 min ▮ Better absorbed IM/ SQ than diazepam		▮ Drug of choice for acute seizures ▮ Slower onset than diazepam, but longer duration in CNS ▮ No ceiling dose, though may cause prolonged sedation			
diazepam (Valium, Diastat)	**IV:** 0.2-0.5 mg/kg **Adult:** 10 mg **Max:** <5 yoa: 5 mg; >5 yoa: 10 mg **PR:** 0.5 mg/kg, then 0.25 mg/kg in 10 min and then: **2-5 yoa:** 0.5 mg/kg/dose **6-11 yoa:** 0.3 mg/kg/dose **>12 yoa:** 0.2 mg/kg/dose **Max:** 20 mg	**Solution:** 5 mg/5 mL, 5 mg/mL **Tablets:** 2, 5, 10 mg **Injection:** 5 mg/mL **Gel, Rectal:** 2.5, 10, 20 mg	**PO** **SL** **PR** **IM** *(poor)* **IV**	**PO:** 30-90 **PR:** 2-10 **IV:** 1-3	**PO:** 1-1.5 **PR:** 1.5	15-50
	▮ Weight-based dosing adjusted due to age-related metabolism ▮ Tablets may be crushed and given SL or PR ▮ Well absorbed PR (slower) and SL ▮ IV formulation may be given PR ▮ Rectal gel expensive, dose must be rounded by 2.5 mg, contains benzoate, benzyl alcohol, ethanol 10%, and propylene glycol ▮ Dilute injection & administer at a rate NTE 2 mg/min. Injection contains benzyl alcohol.		▮ Short duration of action due to rapid redistribution into peripheral tissues ▮ Caution in neonates; decreased ability to metabolize ▮ Active metabolite can accumulate in patients with renal insufficiency ▮ IM not recommended: tissue necrosis[45]			

Medication	Typical Starting Dose**	Pediatric Formulation Considerations	Routes	Onset (min)	Peak (hr)	t½ (hr)
clonazePAM (KlonoPIN	**< 10 yoa:** 0.01-0.03 mg/kg ÷ q8-12h **Max:** 0.2 mg/kg/day **>10 yoa:** 0.5 mg q8h **Maintenance:** 0.05-0.2 mg/kg/day **Max:** 20 mg/day **Adult:** 2-10 mg/day **↑ by 0.5 mg q3day to effect**	**Tablets, ODT:** 0.125, 0.25, 0.5, 1, 2 mg **Tablets:** 0.5, 1, 2 mg	**PO** **SL** **PR**	**PO:** 20-60 **PR:** 10-30	**1-2**	22-33
	▮ Tablets may be crushed for SL or PR ▮ ODT tablets expensive ▮ Injection not available in U.S		▮ Long duration of action ▮ For absence, myoclonus, & prophylaxis ▮ SE (↑): drooling, sedation, cognitive effects			
midazolam (Versed, Buccolam)[25-29, 46]	**0.2-0.5 mg/kg** **Max:** 10 mg; (IM Max: 6 mg) **Cont IV:** 0.06-0.12 mg/kg/hr ▮ Dose based on ideal body weight in obese patients	**Syrup:** 2 mg/mL **Injection:** 1, 5 mg/mL	**PO** **SL** **IN** **IV** **SQ** **IM**	**PO:** 10-20 **IN:** 5 **IM/SQ:** 15-20	**IV:** 0.1 **IM:** ¼ - ½ **IN:** 0.2	2-12
	▮ Divide IN between nares ▮ Injection may be give buccally ▮ Oromucosal as effective as IV or PR diazepam		▮ Short duration of action; seizures may recur ▮ Intranasal route has rapid onset			
clobazam (Ofni)[47-48] >2 yoa	**< 2 yoa:** 0.5-1 mg/kg/day **2-16 yoa:** 5 mg/day **Max:** 40 mg/day **Adult:** 5 mg bid, Usual: 20 mg bid	**Tablets:** 5, 10, 20 mg	**PO**	**No report**	**½ - 4**	16
	▮ ↑ dose q5 days ▮ Tolerance develops ▮ May crush & mix in applesauce ▮ Safety alert: Stevens-Johnson syndrome (SJS) & toxic epidermal necrolysis (TEN)		▮ Intermediate duration of action ▮ Adjunct treatment for Lennox-Gastaut ▮ Adjust dose in hepatic impairment ▮ SE: ↓ bone density & bone length			

**Use cautiously in patients outside of FDA and manufacturer recommended age parameters.*
*** Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

Table 9. Additional Options for Acute Seizure Management Refractory to Benzodiazepines[6,9,23]

Medication	Parenteral	Rectal	Enteral (feeding tube)
levETIRAcetam[32-34, 39-44]	▮ Load: 20-60 mg/kg	▮ Insufficient PR data ▮ Only use if sole option ▮ IR tablets or suspension8	▮ Load: 20-40 mg/kg ▮ Peak: approximately 1 hr
PHENobarbital	▮ Load: 15-20 mg/kg IV/IM/SQ/IO ▮ May repeat x1 in 15 minutes ▮ NTE 1 mg/kg/min ▮ Onset IV: within 5 minutes; IM: 2-4 hr	▮ Bolus: 20 mg/kg ▮ Slow absorption ▮ Injection or oral solution	▮ Onset: 20-60 minutes ▮ Peak: 1-6 hrs
phenytoin[19]	*Use FOSphenytoin IV* ▮ Load: 15-20 mg/kg IV/IM/SQ ▮ NTE 3 mg/kg/min or 150 mg/min ▮ IM divide between 4 sites ▮ Peak IV: 30-60 minutes ▮ Peak <6 months IM: 1-3 hr ▮ Peak >7 months IM: within 30 minutes	▮ Poor absorption rectally ▮ Not recommended for PR administration	▮ Bolus: 20 mg/kg ▮ May need higher doses ▮ Shake suspension well[35-36] ▮ Separate from feeds by 2 hours before and after[37-38] ▮ Poor jejunal absorption ▮ Peak: 2-3 hours
valproic acid	▮ Load: 20-40 mg/kg IV over 10-15 min ▮ Peak at end of infusion	▮ Bolus: 20 mg/kg ▮ Dilute syrup 1:1 with water ▮ Peak: 1-3 hours	▮ Load: 20 mg/kg ▮ Peak: 1-2 hrs

See Table 8 for benzodiazepine specifics
See Table 10 for more specifics regarding the medications listed in this table

Clinical Pearls

- For patients with pre-existing seizure disorders, continue the patient's current anticonvulsant medication, as long as seizures are controlled.
- Attempt to identify reversible causes of increased seizure activity and if possible correct them.
- Patients who experience one simple febrile seizure, with a normal neurological exam, typically do not need further testing or treatment. However, patients with recurrent seizures will often need AED therapy even if the reversible cause is treated.[1, 75]
- Patients may need intermittent dosing of an additional AED or increased doses during an episode of increased seizure activity, such as during an acute illness.
- The half-life of most AEDs is quite long; therefore missing one dose of a maintenance AED due to a temporary NPO status is manageable in most situations.
  - However, if the patient has poor seizure control, recently has had seizures, or requires multiple AEDs, alternative therapy must be sought more urgently.
  - If patient loses swallowing ability, consider alternative agents (Table 7).
- In patients with a seizure history, seizure activity can become more frequent or severe in the terminal phase. It is important to educate the family regarding this possibility and ensure they are prepared for this phase. Conversations with the parents can help determine an appropriate plan of care.[76]
- A working relationship with a neurologist experienced in pediatric epilepsy can be beneficial.
- Many children are able to taper their AED after two years without seizures. [77]
- Adolescents prefer an AED regimen that least disrupts their activities, including side effects.[16]

- LevETIRAcetam (Keppra) has a favorable pharmacokinetic and safety profile, lacks significant drug interactions or adverse effects, and has broad-spectrum antiepileptic activity.
- Valproic acid is effective for all seizure types, but has significant risk of hepatotoxicity, especially in patients <2 years of age.
- PHENobarbital is an appropriate agent for maintenance and rescue therapy in pediatric patients, but risks versus benefits must be weighed in each patient.
- Maintenance therapy with phenytoin may be difficult in children. Phenytoin suspension should be used cautiously due to inconsistencies in drug delivery and interactions with tube feeds.
- While convenient, diazepam rectal gel (Diastat) is expensive. All benzodiazepines can be given rectally using other formulations. Sublingual/buccal administration of benzodiazepines may be convenient, provide parent satisfaction, require less time for administration, and have quicker onset of action. Buccal[25-27] and intranasal[28-29] midazolam are as effective as rectal diazepam with increased patient/family satisfaction.

Table 10. Pharmacological Management of Seizures[23,49]

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Barbiturate			
PHENobarbital[50-52] No age restriction	**Load:** 15-20 mg/kg **Maintenance:** generally 2.5 mg/kg q12h **<1 yoa:** 2.5-3 mg/kg q12h **1-5 yoa:** 3-4 mg/kg q12h **5-12 yoa:** 2-3 mg/kg q12h **>12 yoa:** 0.5-1.5 mg/kg q12h **Adult:** 100-600 mg/day ▮ Long t½ allows for possible once daily dosing ▮ Can be difficult to titrate when given orally[10]	**PO** **PR** **IV** **IM** **SQ**	**Elixir:** 20 mg/5 mL **Tablets:** 15, 16.2, 30, 32.4, 60, 100 mg **Injection:** 65, 130 mg/mL ▮ Well absorbed rectally; same dose as oral ▮ Dilute injection with equal volume of compatible fluid and administer at a rate NTE 1 mg/kg/min. Risk of extravasation. ▮ An alcohol free suspension can be made from PHENobarbital tablets (10 mg/mL)
	▮ Significant drug interactions; Induces its own metabolism ▮ May aggravate absence seizures in high doses[18] ▮ SE: Cognitive dysfunction, sedation, rash, ↓ bone density, hyperactivity (young children) ▮ Therapeutic serum levels: 15-40 mcg/mL; Signs of toxicity: drowsiness, nystagmus, ataxia		
Corticosteroids			
dexamethasone (Decadron) No age restriction	**0.1 mg/kg/day in 2-4 divided doses** **Adult:** 16-24 mg/day in divided doses ▮ May dose daily or bid (morning and noon) to prevent insomnia	**PO** **SL** **PR** **IV** **SQ**	**Solution, Elixir:** 0.5 mg/5 mL (5% EtOH) **Solution, concentrate:** 0.5 mg/0.5 mL (30% EtOH) **Tablets:** 0.5, 0.75, 1, 1.5, 2, 4 mg **Injection:** 10, 25, 50 mg/mL ▮ Solutions contain alcohol, propylene glycol, & benzoic acid. Use injection (10 mg/mL PF) PO. ▮ PR can cause rectal irritation ▮ Administer slow IV push over 1-4 min or dilute and infuse over 15-30 min
	▮ First line therapy in seizures related to brain tumor, metastases, or increased intracranial pressure ▮ Decreases inflammation around brain lesions		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
Anticonvulsants			
carBAMazepine (TEGretol) **IR:** No age restriction **ER:** >6 yoa	**<6 yoa** **Initial:** 10-20 mg/kg/day divided q8-12h if using tablets or q6h if using suspension **Max:** 35 mg/kg/day **6-12 yoa** **Initial:** 5 mg/kg q12h (Initial Max: 100 mg) or 2.5 mg/kg q6h if using suspension **Typical:** 400-800 mg/day **Max:** 1,000 mg/day **>12 yoa** **Initial:** 200 mg bid **Titration:** 200 mg/24h q7d intervals **Typical:** 800-1200 mg/day divided **Max Dosing:** **12-15 yoa:** 1,000 mg/day **15-18 yoa:** 1,200 mg/day **Adult:** 1,600-2,400 mg/day ▮ Increase dose weekly until optimal response ▮ Can be rapidly loaded[53] ▮ Dose may need increased every 2-3 weeks due to auto-induction of hepatic metabolism	**PO** **PR**	**Suspension:** 100 mg/5 mL **Tablet, chewable:** 100 mg **Tablets:** 200 mg **Tablets, ER:** 200, 400 mg **Capsule, ER sprinkle:** 100, 200, 300 mg ▮ Administer suspension q6h ▮ Suspension contains sorbitol & provides inconsistent delivery ▮ Absorbed rectally (slower) using IR forms; PR:PO ratio 1:1 ▮ Do not crush or chew extended-release tablets; Ghost tablets may be seen in stool ▮ Sprinkle formulations can clog feeding tubes[19]
	▮ Significant drug interactions ▮ Caution: compromised bone marrow function (immunocompromised) ▮ SE: anemia (potentially fatal), agranulocytosis, rash, hyponatremia, ↓bone density, teratogenic, anemia ▮ Minimize side effects by giving largest dose at bedtime ▮ Asians are at increased risk of Stevens-Johnson syndrome ▮ May exacerbate certain seizure types in children with mixed seizure disorders[18,21] ▮ Therapeutic serum level: 4-12 mcg/mL; Pro-convulsant at levels >12 ▮ Possible mood stabilization[8]		
ethosuximide (Zarontin) >3 yoa	**<6 yoa:** 7.5 mg/kg bid **Max:** 250 mg/dose; 1,500 mg/day **>6 yoa:** 250 mg bid	**PO**	**Solution:** 250 mg/5 mL **Capsule:** 250 mg ▮ Solution contains sodium benzoate
	▮ Beneficial in absence seizures; may worsen tonic-clonic seizures[18] ▮ Caution: hepatic or renal dysfunction		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
gabapentin (Neurontin) >3 yoa	**1 mon-3 yoa:** 30-40 mg/kg/day **3-12 yoa** **Initial:** 10-15 mg/kg divided q8h **Typical Maintenance:** 3-4 yoa: 40 mg/kg divided q8h 5–12 yoa: 25-35 mg/kg divided q8h **Max:** 50 mg/24 hr **>12 yoa** **Initial:** 300 mg tid **Typical:** 900-1800 mg divided q8h **Max:** 3600 mg/day ▮ Gradually titrate dose over three days	**PO**	**Solution:** 250 mg/5 mL **Capsules:** 100, 300, 400 mg **Tablets:** 300, 600, 800 mg ▮ Not absorbed rectally
	▮ Minimal drug interactions ▮ May worsen Lennox-Gastaut[18] ▮ Increased clearance in children <6 yoa ▮ Adjust dose in renal impairment ▮ SE: weight gain, somnolence, behavioral (↑ in mental retardation or attention deficit disorder) ▮ Effective for neuropathic pain		
lacosamide (Vimpat)[54-56] >3 yoa	**0.5 mg/kg q12h** **Max:** 50 mg ▮ Increase weekly by 1 mg/kg/day up to 10 mg/kg/day **Adult:** 50 mg bid	**PO** **IV**	**Solution:** 10 mg/mL **Tablets:** 50, 100, 150, 200 mg **Injection:** 10 mg/mL ▮ Solution contains propylene glycol ▮ No data for PR administration ▮ IV only recommended for 5 days
	▮ Adjust dose in renal or hepatic impairment ▮ SE: Prolongs PR interval, somnolence, irritability		
lamoTRIgine (LaMICtal) >2 yoa	**Initial:** 0.15-0.6 mg/kg/day ▮ Patient specific dose dependent on other enzyme-inducing agents patient is receiving ▮ Adult: 25-50 mg daily to every other day ▮ Titrate slowly to avoid rash (over 8 weeks or more) ▮ Infants may require q8h dosing	**PO** **PR**	**Tablets, chewable:** 2, 5, 25 mg **Tablets, ODT:** 25, 50, 100, 200 mg **Tablets:** 25, 100, 150, 200 mg **Tablets, ER:** 25, 50, 100, 200, 250, 300 mg ▮ Do not use partial chewable tablets ▮ Absorbed rectally; PR:PO ratio 2:1 ▮ Disintegrating tablets dissolve in 10 mL water for tube administration[19]
	▮ Not indicated for initial monotherapy; may exacerbate myoclonic epilepsy ▮ Significant interaction with valproate ▮ SE: rash (more common in children)57, Stevens-Johnson Syndrome, minimal cognitive effects ▮ May be pro-convulsant at high doses, use caution with doses > 15 mg/kg/day ▮ Possible mood stabilization		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
levETIRAcetam (Keppra)[32-34, 39-44, 58-67] No age restriction	**10-20 mg/kg q12h** **Adult:** 500 mg bid, ↑'d to 1,500 mg bid **Max:** 3,000 mg/day ▮ May be rapidly titrated if needed[66] ▮ Higher doses per weight needed in children[63] ▮ Doses of 115 mg/kg have been documented[41, 60] ▮ IV:PO ratio 1:1	PO PR IV	**Suspension:** 100 mg/mL **Tablets:** 250, 500, 750, 1,000 mg **Tablets, ER:** 500, 750 mg **Injection, solution:** 100 mg/mL **Infusion, premixed:** 500 mg/100 mL ▮ Insufficient data for PR administration[8] ▮ Bitter taste if IR tablets crushed or broken. Dissolve in 10 mL water & shake 5 min[19]
	▮ Well tolerated & minimal drug interactions ▮ Clearance ↑ (40%) in children;67 Adjust dose in renal impairment ▮ SE: aggression/hostility/irritability (common in children), vomiting, cough, fatigue, congestion, ↓appetite ▮ Neurologically handicapped children have ↑risk of SE and ↓response[62]		
OXcarbazepine (Trileptal) **Adjunct:** >2 yoa **Monotherapy:** >4 yoa	**2-16 yoa:** 8-10 mg/kg/day divided bid ▮ Dosing varies based on monotherapy vs adjunctive ▮ ↑ dose slowly over 2-3 weeks by 5 mg/kg/day ▮ Adjunctive therapy NTE 60 mg/kg/day divided bid **Adult:** 300 mg bid; Maintenance: typically 600 mg bid	PO	**Suspension:** 300 mg/5 mL **Tablets:** 150, 300, 600 mg ▮ Poor rectal absorption
	▮ Significant drug interactions ▮ ↓ risk of hyponatremia in children[14-15] ▮ SE: somnolence, gait disturbances, rash, bone marrow suppression, minimal cognitive effects ▮ Clearance ↑ (40%) in < 6 yoa ▮ Adjust dose in renal impairment ▮ May exacerbate generalized epilepsy ▮ Effective against neuropathic pain		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
phenytoin (Dilantin)[51, 68] No age restriction	**Load:** 15-20 mg/kg **Initial maintenance:** 2.5 mg/kg q12h **Typical Maintenance Dose:** **0.5-3 yoa:** 8-10 mg/kg/day **4-6 yoa:** 7.5-9 mg/kg/day **7-9 yoa:** 7-8 mg/kg/day **10-16 yoa:** 6-7 mg/kg/day ▮ ER capsules can be dosed once daily if < 300 mg ▮ Tablets and liquid cannot be dosed daily ▮ Erratic rectal absorption	**PO** **IV**	**Suspension:** 125 mg/5 mL **Tablets, Chewable:** 50 mg (not generic) **Capsules:** 30, 100 mg **Capsules, ER:** 100, 200, 300 mg **Injection:** 50 mg/mL ▮ Shake suspension35-36 ▮ May contain benzyl alcohol ▮ Utilize FOSphenytoin IV to decrease risk of extravasation, hypotension, and allow faster administration
	▮ Adheres to feeding tubes. Separate from tube feedings by 2 hours.[19,38] ▮ May exacerbate juvenile myoclonic[21] ▮ Significant drug interactions ▮ Decreased protein binding in children; increased free drug ▮ SE: rash, gingival hyperplasia, hirsutism, ↓ bone density, nystagmus, ataxia, cognitive impairment ▮ Unpredictable pharmacokinetics at higher dosages (non-linear) ▮ Therapeutic serum levels: 10-20 mcg/mL; Pro-convulsant effects at levels >[20]		
topiramate (Topamax) >2 yoa	**2-16 yoa:** 1-3 mg/kg qhs **Max:** 25 mg **Usual maintenance:** 5-9 mg/kg/day divided bid **>17 yoa:** 25-50 mg/day **Usual maintenance:** 100-200 mg bid ▮ ↑ weekly by 1-3 mg/kg/day or 25-50 mg/day ▮ Doses > 400 mg/day not shown effective ▮ Dose varies based on other AEDs ▮ Titrate doses slower for tonic-clonic seizures ▮ Higher doses used for infantile spasms	**PO** **PR**	**Capsule, sprinkle:** 15, 25 mg **Tablet:** 25, 50, 100, 200 mg ▮ Sprinkles can clog feeding tubes[19] ▮ Tablets can be crushed (bitter taste) ▮ PR:PO ratio 1:1; using tablets, not sprinkles
	▮ Increased clearance in children ▮ Adjust dose in renal impairment ▮ SE: oligohidrosis (↑), cognitive dysfunction, weight loss, drowsiness, metabolic acidosis, nephrolithiasis[70] ▮ Effective for migraine prevention, diuretic, may ↓intracranial pressure		

Medication & Age Guide*	Typical Starting Dose**	Routes	Pediatric Formulation Considerations
valproic acid, divalproex sodium (Depakene, Depakote) **IR:** >2 yoa **ER:** >10 yoa	**Initial:** 10-15 mg/kg divided q8-24h **Maintenance:** 30-60 mg/kg divided q8-12h **Adult:** 1,000-2,500 mg/day divided q8-24h **Max:** 60 mg/kg/day ▮ Increase dose by 5-10 mg/kg/day weekly ▮ Adjunctive therapy may require higher doses[71-72] ▮ IV: same total daily dose divided q6h ▮ PR:PO ratio 1:1; using liquid form, not EC forms ▮ Sprinkles may be mixed with semisolid food. Do not crush or chew sprinkle beads. Sprinkles can clog feeding tubes.[19]	**PO** **PR** **IV**	**valproic acid:** **Syrup:** 250 mg/5 mL **Capsules:** 250 mg **Capsules, ER:** 125, 250, 500 mg (no generic) **Injection:** 100 mg/mL **divalproex sodium:** **Capsules, sprinkle:** 125 mg **Tablets, EC:** 125, 250, 500 mg **Tablet, ER (24 hr):** 250, 500 mg ▮ Depakote & Depakote ER not bioequivalent
	▮ ↑ risk of hepatotoxicity in < 2 yoa;57,73 L-carnitine supplementation may prevent hepatotoxic effects[74] ▮ Effective in all types of seizures and in refractory status epilepticus ▮ Significant drug interactions (more pronounced in children) ▮ Contraindications: liver dysfunction, urea cycle defects ▮ SE: weight gain, menstrual irregularities, polycystic ovarian syndrome, thrombocytopenia, rash, encephalopathy, hyperammonia, pancreatitis, tremor, hair loss ▮ Therapeutic serum levels: 40-100 mcg/mL ▮ Possible mood stabilization & migraine prevention		
zonisamide (Zonegran) >16 yoa	**<16 yoa:** 1-2 mg/kg/day divided bid **Usual:** 5-8 mg/kg/day **Max:** 12 mg/kg/day **> 16 yoa:** 100 mg/day **Usual:** 100-600 mg/day divided bid ▮ ↑ dose by 0.5-1 mg/kg/day or 100 mg/day q2 weeks ▮ Higher doses needed for infantile spasms	**PO**	**Capsules:** 25, 50, 100 mg ▮ Powder soluble in water or juice ▮ Insufficient data for PR administration ▮ Extemporaneous recipe available[69]
	▮ Caution: renal or hepatic dysfunction ▮ Minimal drug interactions ▮ SE (less common in children): weight loss, rash, somnolence, kidney stones, oligohydrosis		

**Use cautiously in patients outside of FDA and manufacturer recommended age parameters.*
*** Do not exceed usual maximum adult starting doses. Not intended for use in neonatal population.*

Excerpted from Hunt MO, Protus BM, Winters JP, Parker DC. Pediatric Palliative Care Consultant: Guidelines for Effective Management of Symptoms. Montgomery, Al: HospiScript; c2014. p. 255-272.

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Items of Interest!

Please help us keep the items of interest up to date. Share your news, upcoming conferences or webinars. Are there particular podcasts that may be of interest to our readers? Send any items of interest to Christy at Christy.Torkildson@gcu.edu**. Thank you.**

1. **Pediatric Palliative Care Webinar Series for 2024** has been announced. Calendar and more information, including how to register can be found at www.ppcwebinars.org

2. **Upcoming Conferences:**

   - AAHPM & HPNA Annual Assembly 2024 will be in Phoenix, Arizona in March. Register for more information.
   - The 2024 NHPCO Interdisciplinary Team Conference will be held in April Virtually. Call for proposals will open in September. More information can be found on the NHPCO website.
   - Have a conference to submit/share – send us the information to Christy.Torkildson@gcu.edu.

3. **Subjects and Contributors for Future Issues of this E-Journal**

   Our future issues will be centered on the following main themes. If you have any thoughts about these or any other topics, contributors, or future issues, please contact **Christy** at Christy.Torkildson@gcu.edu or **Suzanne** Toce at tocess@gmail.com.

   Issue Topics: 2023

   - Let us know your ideas! What topics would you like to see addressed in the Pediatric e-Journal? Issues will be distributed in February, May, August, and November.
   - **Issue 74 will be focused on children with complex medical conditions.** As we hope you know, each issue is focused on a central topic and articles represent many different perspectives from a variety of disciplines, including families, about that topic. This issue will be distributed in Feb. 2024 and articles should be submitted prior to January 1st.
   - **Issue 75 is our celebration issue!** Please share your wins in pediatric palliative and hospice care. What is the state of pediatric palliative and hospice care in your region? In your state? Any new programs? Ongoing challenges? Distribution will be May, 2024 and articles are due by the end of March, 2024.
   - **2024: Issues 76 and 77 will be distributed in August and November.** If you have any thoughts about topics for these two issues or suggestions for contributors, or future issues, please contact **Christy** at Christy.Torkildson@gcu.edu or our **Senior Editor Chuck** at charles_corr@comcast.net

4. **Our 75th Issue will be distributed in May of 2024!** Please share your news! What is happening in your region, or in your state? How are children with serious illnesses able to access services in your area? Any new programs? Any programs celebrating special anniversaries? We welcome your contributions and your suggestions.

5. **NHPCO Pediatric Website Pages have been updated for easier searching!**

   NHPCO Palliative Care Online Resources: NHPCO has a variety of pediatric hospice and palliative care resources available at www.nhpco.org/pediatrics. Also, more palliative care resources are available at www.nhpco.org/palliativecare, including:

   - Community–Based Palliative Care
   - Legal and Regulatory Resources
   - Webinars and Courses
   - Brochures in English and Spanish for families
   - Plus, more for NHPCO members

6. **Palliative Care Programs and Professionals:** Founded in 1978, National Hospice and Palliative Care Organization (NHPCO) is the world's largest and most innovative national membership organization devoted exclusively to promoting access to hospice and palliative care and to maintaining quality care for persons facing the end of life and their families. Join NHPCO Today!
   Individual Palliative Care Membership
   Palliative Care Group Application - Save by registering your entire team

7. **In partnership with the National Association for Home Care & Hospice,** NHPCO is collecting response for a survey (link: www.surveymonkey.com/r/KPVKNHR) on the state of pediatric concurrent care across the country and to inform national advocacy efforts. Individuals familiar with the policies, challenges, and successes of concurrent care at the state level should complete the survey.

Note: *Many of the pediatric resources are open access as a community service by NHPCO and membership is not required. However, we would love to have you join our community of vested professionals focused on quality palliative and hospice care throughout the lifespan!*

Previous Items of Interest:

8. **Did you know that the State Coalitions from Pennsylvania, Illinois and California, with support from the Shiley Haynes Institute for Palliative Care and the HAP Foundation,** host monthly, affordable webinars with continuing education units available? You can register for one or the entire series, with discounts for multiple registrations. For more information, review the PPC website.

9. **On that same note, did you know there was a network of state coalitions and folks interested in helping with or starting a state coalition for Pediatric Palliative Care?** For more information, **contact Betsy betsy@ppcc-pa.org**

10. **End-of-Life Nursing Education Consortium (ELNEC) project** has several upcoming courses; click on the name for more information.

11. **Recently, the California Advocacy Network for Children with Special Health Care Needs announced their foundation had committed to increasing access to journal articles that may be difficult for family members and non-profit staff to access to improve "effective and equitable systems" as "access to scholarly work is essential to system improvement."** More information can be found on the California Advocacy Network for Children website. It may be helpful to contact your state's chapter to determine what resources they may have!

12. **Courageous Parent's Network** has a wealth of resources for parents, caregivers, and providers. The list is too long to add here so please check out CPN's website.

13. **The Pediatric Palliative Care Coalition of Pennsylvania, the Greater Illinois Pediatric Palliative Care Coalition, and the Funeral Service Foundation have created a community resource to guide families through the funeral/ memorialization planning process:**

    When a Child Dies: Planning Acts of Love & Legacy

    This resource is available in both English and Spanish and is FREE, thanks to generous funding from the Funeral Service Foundation. You pay only a nominal shipping fee. More information can be found at When A Child Dies.

14. ***Pediatric Go Wish Together:*** A conversation game for parents and pediatric caregivers; developed by Meghan Potthoff, Ph.D., APRN-NP, PPCNP-BC, CPNP-AC in collaboration with Coda Alliance. This game is "developed to help parents navigate the unimaginable journey of their child's illness." "It is a tool that provides parents and providers a way to think and talk about what's most important to the child". More information can be found at Pediatric Go Wish Together

15. **Have you heard of the new organization PallCHASE: Palliative Care in Humanitarian Aid Situations and Emergencies?** Their primary ambition is the relief of suffering, and their purpose "To work in partnership through a visible and effective network to advocate for palliative care integration in humanitarian situations or emergencies...". Please visit their website for more information, healthcare professional training and resources in a variety of languages! Check out their website!

16. **Another great new group is the Child Life in Hospice and Palliative Care Network, which provides child life specialists working in hospice or palliative care access to resources, education, research, and networking opportunities to establish and provide best practice care for patients and families experiencing a serious illness.** They are requesting that interested members fill out a brief survey, sign up today at CLHPN

17. **A Toolkit of Autism, Grief, and Loss Resources by Hospice Foundation of America**
The toolkit will include a variety of materials and resources, such as:

- suggestions for responding to the grief experiences of autistic adults;
- ways to provide for choice and inclusion in rituals;
- tips for communicating the news of death;
- social stories on grief for adults;
- videos about grief, including interview clips with autistic adults and their families;
- two complimentary continuing education (CE) programs for professionals; and much more!

18. **A resource for pregnancy or infant loss is Share: Pregnancy & Infant Loss Support.** Share was started in 1977 in response to the urging of one bereaved family by Sr. Jean Marie Lamb, OSF. Initially providing support groups, they now offer online support groups, education, and support for families and caregivers.

19. **The Pediatric Palliative Care Coalition of Pennsylvania (PPCC) has made a new resource available – a Sibling Grief and Bereavement Toolkit.** This Toolkit has been developed to address the needs and concerns of children and teens who have experienced the death of their sibling with medical complexities. Please see the associated article in this edition! Below is a link to the toolkit and one of the activities – **"Make a Feelings Chart"**.
View the PPCC Sibling Grief and Bereavement Toolkit.

Toolkit Activity

For children who are grieving the loss of their siblings, returning to school can be a difficult transition. Check out this month's highlighted activity from the toolkit that may help children and teens in the upcoming school year.

Make a Feelings Chart by downloading the activity. **PPCC invites you to share this information with parents, caregivers, medical professionals, providers, therapists, etc.**

20. **Pediatric Hospice and Palliative Care Resources:**
- **CaringInfo,** a program of the National Hospice and Palliative Care Organization, provides free resources to help people make decisions about end-of-life care and services before a crisis. www.caringinfo.org

NHPCO's Palliative Care Resource Series includes pediatric palliative resources like:

- Communication Between Parents and Health Care Professionals Enhances
- Satisfaction Among Parents of the Children with Severe Spinal Muscular Atrophy
- Consideration for Complex Pediatric Palliative Care Discharges
- Songs of the Dying: The Case for Music Therapy in Pediatric Palliative and
- Hospice Care
- Nonpharmacological Pain Management for Children

- Sibling Grief
- Pediatric Pain Management Strategies
- Communicating with a Child Experiencing the Death of a Loved One: Developmental Considerations
- In an effort to standardize the medication coverage process for children receiving concurrent care, the NHPCO Pediatric Advisory Council developed a new resource for providers titled
- Determination of Hospice Medication Coverage in CHILDREN.

21. **Trends in Pediatric Palliative Care Research**
Every month, PedPalASCNET collects new pediatric palliative care research. For past lists visit their blog, browse in their library, or join the Zotero group. View the New Citation List in their library.

22. **Palliative Care Resources for Nurses, Patient Care Support Staff, and Families of Patients by Life and Death Matters,** https://lifeanddeathmatters.ca/ offers texts, workbooks and resources for providers and family members. Although primarily focused on adults they reference across the lifespan with sound principles that are useful no matter the age of your patients.

The text, workbook and companion resources support nurses and nursing students (in Canada and USA) to develop the knowledge, skills, and attitudes for integrating a palliative approach and providing excellent end-of-life care.

Essentials in Hospice and Palliative Care: A Practical Resource for Every Nurse
Textbook: 978-1-926923-11-6 | Workbook: 978-1-926923-11-6
https://lifeanddeathmatters.ca/product/palliative-care-nurse/

The text, workbook and resources, based on national competencies, will help nurses:

- Develop best practice interactions
- Decrease fears and increase confidence and competence in caring for the dying person and family
- Develop ethically and culturally competent practices with touchstones and by relating experiences

Also available for this title: Videos, Podcasts, PowerPoint™ Presentations and NCLEX-style questions

Palliative Care Resources for Care Aids and Family

- *Integrating a Palliative Approach: Essentials for Personal Support Workers, 2nd Edition; 1926923162*
- *Integrating a Palliative Approach: Essentials for Personal Support Workers 2nd Edition – Workbook; 9781926923178*

This textbook is a rare text that engages you with its warmth and heart—an essential resource for all frontline caregivers and family members supporting loved ones. The companion workbook engages learners through reflective activities, crossword puzzles, worksheets and interactive projects. Video and podcast libraries available on the Life and Death Matters website. https://lifeanddeathmatters.ca/

Please note the archived issues are available as a community-service by NHPCO and can be found at www.nhpco.org/pediatrics or by reaching out to Pediatrics@nhpco.org.

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