

Fundamentals of chronic pain in children and young people. Part 1

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Abstract

Persistent and recurrent pain is a common condition in childhood. Chronic pain can have a negative effect on all aspects of quality of life, including physical, emotional, social and role functioning. A small percentage of these children and young people (5-8%) will experience significant impairments due to their pain condition. Most chronic pain requires a holistic multidisciplinary approach to treatment – pharmacological, physical and psychological strategies. Nurses are key members of the health care team in terms of helping children, young people and their families to manage the negative consequences of chronic pain. This article will review the prevalence, pathophysiology, contributing factors, consequences. Part two, to be published next month, will cover multimodal treatment of chronic pain in children and young people.

Aims and intended learning outcomes

This article aims to provide an evidenced-informed review of the fundamental nursing care practices when working with children and young people experiencing chronic pain and their families. After completing the article and time out activities you will be able to:

- Define chronic pain in relation to children and young people.
- Outline the basic pathophysiology of chronic pain.
- Identify the key factors associated with the development and maintenance of chronic pain in children and young people.

Introduction

Although acute pain can be a symptom of an underlying health concern (for example, lower right quadrant pain associated with appendicitis), chronic pain is not indicative of a health concern but is rather a disease itself (Brookoff 2000, Niv and Devor 2004). Many children and young people will experience chronic pain that is recurrent or persistent in nature, and the management of pain for these patients and families presents a challenge to nurses and other clinicians.

Chronic pain has been defined as pain that persists well past the usual expected time of healing (arbitrarily defined as more than three to six months) or any recurrent pain that occurs at least three times throughout a period of three months (Van Den Kerkhof

and van Dijk 2006, American Pain Society 2012). Some types of chronic pain are idiopathic in nature; these include abdominal pain and wide spread musculoskeletal pain.

Recurrent and persistent pain may also be associated with chronic health conditions such as sickle cell disease, cancer, haemophilia and juvenile idiopathic arthritis. It can also be the result of injury, as in phantom limb pain that occurs after an amputation or complex regional pain syndrome following a minor injury or fracture – both of these are examples of neuropathic pain (nerve pain), which is pain caused by a lesion or disease affecting the somatosensory nervous system.

The most common types of recurrent and persistent pain conditions in children and young people are headaches, abdominal pain, back pain and musculoskeletal pain (King *et al* 2011). Many experience pain in different parts of their body but report that having a headache is most disabling in terms of interference with usual activities (Van Gessel *et al* 2011). Acute and chronic pain may occur concurrently. For example, children with arthritis might live with persistent chronic pain but, from time to time, may experience an acute flare in their pain. Acute pain that is not treated effectively can become chronic.

The Pediatric Chronic Pain Task Force – which is a subcommittee of the American Pain Society (APS) – have provided a description of chronic pain in children

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Conflict of interest

None declared

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that acknowledges the involvement of biological, psychological and social factors in the development and maintenance of chronic pain.

'Chronic pain in children [and adolescents] is the result of a dynamic integration of biological processes, psychological factors, and sociocultural context, considered within a developmental trajectory. This category of pain includes persistent (ongoing) and recurrent (episodic) pain in children with chronic health conditions (for example, arthritis or sickle cell disease) and pain that is a disorder itself (for example, migraines, functional abdominal pain, complex regional pain syndrome)' (Bursch 2000).

In children, chronic pain is a serious health problem and can result in significant pain-related disability. Pain-related disability is the term used to describe the interference with physical and social functioning – absences from school, no longer able to participate in sports and activities, not going out with friends – which children and young people with chronic pain can experience.

Based on a recent systematic review of 38 pain prevalence studies conducted in several countries, 11-38% of children and young people will experience chronic pain (recurrent and/or persistent) (King *et al* 2011); and 5-8% of children and adolescents will experience significant pain related disability (Huguet and Miró 2008, Stanford *et al* 2008, Perquin *et al*

2000). Pain-related disability has been found to increase with age (Huguet and Miró 2008).

Now do time out 1.

Differences between types of pain

Acute pain results from a noxious stimulus from three types of insult: mechanical (for example pressure, swelling, tumour growth), chemical (for example, toxic substances such as corrosives, build up of lactic acid in muscles) and thermal (heat or cold). It acts as a warning system to protect the body against further damage by ensuring that an individual seeks medical attention, limits the use of the injured body part, or removes the body part from the insulting agent.

In contrast, chronic pain often has multiple causative factors, is not usually accompanied by ongoing nociceptive activation, pain intensity is often not proportional to objective physical findings and it serves no protective function.

Anatomy and physiology of pain Knowledge of nervous system anatomy and physiology is fundamental to understanding pain, its presentation and management. A nociceptor is a sensory nerve ending capable of responding to noxious (painful) stimulation. The activation of nociceptors is essentially a chemical process because they have receptors that respond to different mechanical, thermal or chemical stimuli. These stimuli affect the degree of response and thus pain intensity.

The mechanisms involved in pain perception (nociception) can be divided into four processes: transduction, transmission, perception and modulation. Transduction is the response of sensory afferent fibres to being stimulated by a noxious insult. Transmission is the relay of the signal from the afferent fibre to the dorsal horn in the spinal cord, up to the brain stem, and onward to the higher levels in the brain.

Figure 1 shows that the brain receives pain signals along two main pathways: the lateral and the medial systems. The lateral system transmits information about injury, the location and intensity. The medial system carries slower signals about the persistence of injury and response.

Perception is when the pain is perceived by an individual as a conscious multidimensional experience with affective and sensory component. This means that sensation from a painful stimulus and psychological states can affect pain. For example, psychological strategies, such as distraction, can take attention away from the pain and decrease its intensity. Likewise, pain catastrophising (a set of exaggerated and negative cognitive and emotional beliefs about pain) can negatively affect pain perception and increase pain (Quartana *et al* 2009, Weissman-Fogel *et al* 2008).

1 Prevalence of chronic pain

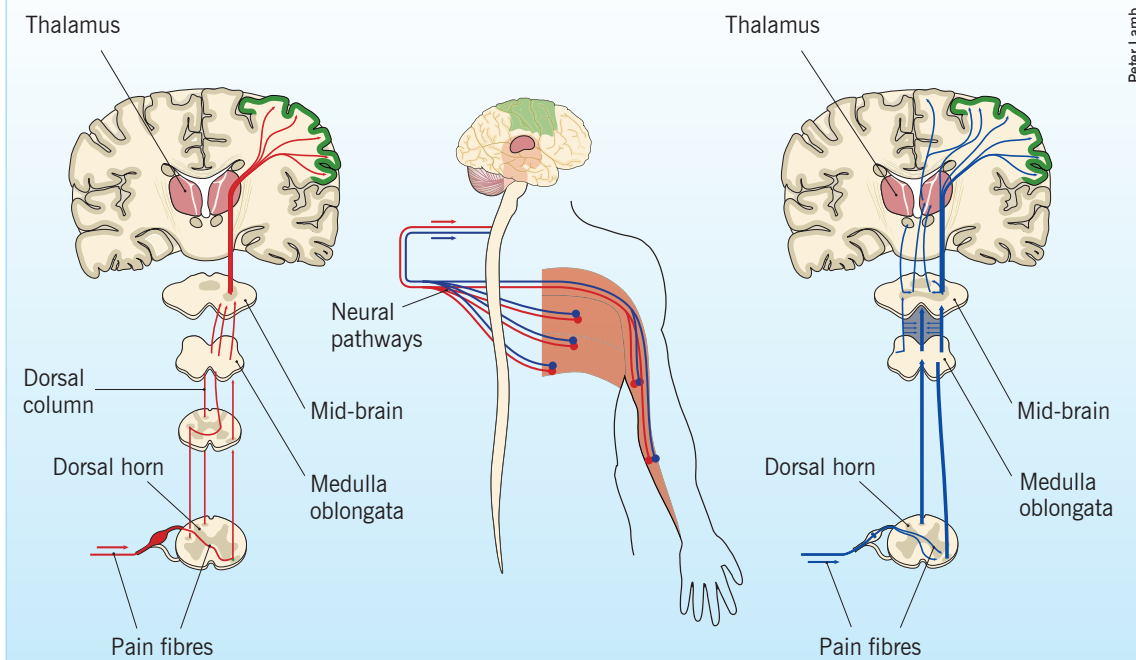
Time out

Most countries collect data on the number of children and young people living in a country. Based on the population in your country, calculate how many of these children and young people will experience chronic pain at some point and how many will experience disability associated with pain?

For example, in 2013, the population of people aged 19 years and younger living in Canada was 7.85 million (Statistics Canada 2014). Based on this statistic, between 863,500 and 2.9 million will experience chronic pain and about 392,000-628,000 will experience disability because of their pain.

- Does the number of children and young people experiencing chronic pain surprise you?
- When you reflect on your own practice, does the incidence of chronic pain in children match your experience?
- How does the definition of chronic pain above relate to your previous understanding of chronic pain?

Figure 1 Pain transmitted to a brain via two pathways: lateral system (left) and medial system (right)



Peter Lamb

Modulation is the body's internal dampening mechanisms to decrease or inhibit the transmission of pain, which can occur due to the body's endogenous opioids (enkephalins and endorphins). However, due to the plasticity of the central nervous system (ability to change neural pathways and synapses) pain processing can become abnormal, resulting in chronic pain (May 2007, Loeser and Melzack 1999).

In comparison with acute pain, chronic pain processing is complex and may involve multiple changes in how pain signals are transduced, transmitted, perceived and modulated. Chronic pain does not require the same forms of transduction as acute pain, because a painful stimulus is no longer necessary for the pain to continue (Brookoff 2000). This means that one can feel pain, although there does not appear to be a trigger for it.

Central sensitisation is a term used to describe some of the nervous system changes that are part of chronic pain processing. It refers to an increase in the number and strength of pain signals reaching the brain due to a rise in membrane excitability, and synaptic activity and interference in the pain dampening system in the central nervous system (Latremoliere and Woolf 2009). All these changes result in lower pain thresholds that require smaller (or no) stimuli to trigger intense and widespread pain and a decrease in the body's ability to reduce the amount of pain signals that reach the brain.

Neuropathic pain is a type of pain that may contribute to chronic pain. This type of pain originates from a dysfunction or lesion within the nervous system, which is generally less responsive to treatment than

nociceptive (acute) types of pain (Brookoff 2000). Some, but not all, patients with chronic pain experience hyperalgesia (increased pain from stimuli that normally provokes pain such as a pinprick) or allodynia (pain from stimuli that do not normally provoke pain, such as wearing clothing or light touch).

Children and young people with chronic pain often have their complaints about pain disregarded because clinicians may not have sufficient knowledge about the changes to pain processing that accompany chronic pain as the child usually has no objective physical findings (Forgeron and McGrath 2008, Carter 2002).

Now do time out 2.

2 Pain processing

Time out The differences between acute and chronic pain processing are not well understood by many clinicians. Discuss with a colleague the differences between acute and chronic pain processing.

- How do your colleagues determine if someone's pain is chronic?
- What sorts of symptoms or patient reports do they rely on?
- Do your colleagues' comments differ from what you now understand about changes to pain processing that are the result of chronic pain?
- How would you explain chronic pain to a child, young person or their parents?

Table 1 Differences between acute and chronic pain

Characteristic	Acute pain	Chronic pain
Cause	Usually single obvious cause, for example tissue damage as a result of surgery	Usually multiple causative or triggering factors Neuronal or central nervous system (CNS) abnormality (plasticity, sensitization)
Type	Nociceptive and or neuropathic	Nociceptive, neuropathic or mixed
Purpose	Protective; activation of sympathetic nervous system	No protective function; rarely accompanied by signs of activation of sympathetic nervous system
Duration	Short lived (days to weeks)	Long lasting (>3 months) or recurring beyond time of normal healing May be associated with chronic disease
Pain intensity	Usually proportionate to severity of injury	Often out of proportion to objective physical findings
Treatment	Usually easy to treat with single modalities (pharmacological or physical)	More difficult to treat, requiring multidisciplinary, multimodal treatment approaches
Outcome	Expected to resolve with healing	Pain persists in significant proportion (30-62%) with smaller proportion developing pain-related disability

(Adapted from Stinson and Reid 2013)

Table 1 provides a summary of the similarities and differences between acute and chronic pain.

Factors associated with chronic pain

Biological and psychological factors are associated with the prevalence of chronic pain in children and young people. This section provides a brief overview.

Biological factors These include age, sex, genetics, and the presence of comorbid conditions. Increasing age of the child (onset of puberty) is associated with a rise in the number of young people experiencing all types of chronic pain with the exception of abdominal pain. This is more common in younger children (Stanford *et al* 2008). Sex has also been linked to chronic pain differences, with girls generally reporting chronic pain more than boys (Huguet and Miró 2008, Zernikow *et al* 2012).

A systematic review on the prevalence of chronic pain also found that additional chronic health conditions are associated with increases in chronic pain (King *et al* 2011). Finally, there is emerging evidence that genetics play a role in pain processing and perhaps the susceptibility of an individual to develop chronic pain (Rodriguez Parkitna *et al* 2006). One's genetic predisposition to certain pain-related conditions may be triggered by environmental factors (Buskila 2007). Thus, although objective physical findings may not

be identified, biological factors do contribute to the development and maintenance of chronic pain.

Psychological factors Several psychological factors associated with recurrent and chronic pain in children may also influence pain-related disability. These factors include – but may not be limited to – anxiety, depression and low self-esteem (King *et al* 2011).

However, it is important for nurses to realise that for these psychological factors the research is correlational not causal. Therefore, some children and young people may have chronic pain and anxiety but their anxiety does not cause their pain, and some children and young people have only chronic pain without having any of these psychological factors.

For example, emotional states (that is, anxiety, fear, mood) contribute to exacerbations of pain by various mechanisms that include supra-spinal modulation pathways including the forebrain (hippocampus) (Villemure and Bushnell 2002, Suzuki *et al* 2004, Ploghaus *et al* 2001). This means that these emotional states (that is, fear, sadness) can alter some forms of neurotransmission and synaptic exchange above the spinal cord and in the higher centres of the brain, making the brain more receptive to pain signals. However, treating the emotional state at the exclusion of other factors will not improve function and or eliminate the underlying pain.

Pain-related disability

Although the intensity and duration of pain are related to disability (Gauntlett-Gilbert and Eccleston 2007), there are also individual differences that contribute to pain-related disability. These differences are due to the biological and psychological factors described above – age, sex, genetics, anxiety, mood, as well as the coping styles of children and parents. It is not entirely clear how these factors exert their effects on pain-related disability for children and adolescents (McGrath *et al* 2014). However, studies posit various pathways.

Research suggests that a child or young person's coping style is associated with pain-related disability. Pain catastrophising and ineffective coping styles are associated with increased pain, anxiety, disability, depression and emotional distress in children and young people with chronic pain (Kashikar-Zuck *et al* 2001, 2002, Crombez *et al* 2003, Eccleston *et al* 2004, Merlijn *et al* 2006, Vervoort *et al* 2006, Lynch *et al* 2007, Kashikar-Zuck *et al* 2008, Guite *et al* 2011). Pain catastrophising is characterised by rumination (excessive focus on pain sensations), magnification (exaggerating the threat value of pain sensations) and helplessness (perceiving oneself as unable to cope with pain symptoms) (Sullivan and Adams 2006).

Pain catastrophising is linked to the fear avoidance model of child pain. This model suggests that a minority of children with chronic pain attach a catastrophic meaning to it, leading to fear of pain (especially during activity), pain-related anxiety, and results in children with chronic pain becoming more disabled because they avoid activities (Asmundson *et al* 2012). Therefore, nursing care that helps a young person learn how to stop negative thoughts or create a plan for what to do if they experience pain exacerbations at school may improve the young person's function.

The behaviours exhibited by parents have also been shown to affect how the child copes with pain. For example, when parents frequently talk about pain symptoms, children with higher levels of pain catastrophising reported more symptom complaints (Williams *et al* 2011). Therefore nurses should work with parents to help them understand how to be supportive of their child, but also recognise that their excessive worry can negatively affect their child's ability to cope.

Consequences of chronic pain

Chronic pain can have a negative effect on the child or young person's developmental trajectory by interfering with their physical activities, social life, family life, mood, and academic abilities. The mechanisms may include: absence from school, inability to concentrate leading to significant decreases in grades, parental overprotection, fear of pain during activity, and disruption to social activities and social relationships (Logan *et al* 2008,

Dick and Pillai-Riddell 2010, Forgeron *et al* 2010, Forgeron *et al* 2013). Family life may also be disrupted by a child's pain such as restrictions in the family's social lives and increase in stress of other family members (Hunfeld *et al* 2001).

Socially, children and young people with chronic pain may encounter problems with peers, classmates, and friends. One systematic review concluded that these children and young people have fewer friends and are subjected to increase rates of victimisation; they are perceived by peers as less likeable, and are considered by themselves and their peers as more isolated (Forgeron *et al* 2010). The causes of friendship difficulties are not known, but studies suggest that changes to friendship occur after the onset of chronic pain (Forgeron *et al* 2013). It also appears to be more than simply interfering with their opportunities to meet friends.

Studies reveal that young people with chronic pain interpret unsupportive social interactions with friends more negatively than peers, expect their friends to include them in various situations (that is, ask them about their pain or change plans, so they can participate) and feel different from and disbelieved by even close friends, because their pain has caused them to rethink their future and question their identity (Meldrum *et al* 2009, Forgeron *et al* 2011, 2013).

However, staying engaged with friends is reported to provide them with a source of support (Forgeron *et al* 2013), which may help them identify with their friends, counter loneliness, and therefore protect against feeling depressed.

The specifics of the relationship between the biopsychosocial factors, chronic pain prevalence, pain-related disability and quality of life for children and young people with chronic pain remain unclear. The studies that examine these relationships are correlation studies and therefore do not identify causation. The relationships may be an iterative cycle and therefore strategies targeted at various parts of the cycle are beneficial.

Now do time out 3.

3 Resources

Time out Review the following websites to learn more about chronic pain. The sites contain credible information and are appropriate for parents and young people. Would you recommend these to a patient you know? What are the benefits of these sites for young people and or their parents?

- British Pain Society frequently asked questions, tinyurl.com/bps-pain-faqs
- Chronic Pain and the Teenager, tinyurl.com/chr-pain-teens
- Understanding Pain: What to do About it in Less than Five Minutes, tinyurl.com/youtube-pain

Conclusion

Given the prevalence of chronic pain in children and young people, children's nurses need to be knowledgeable in the care of these patients and families. However, much of the evidence on the assessment and treatment of chronic pain has developed over the last 15-20 years and therefore may not be fully integrated into nursing school (or other healthcare professionals') curricula.

Strategies that solely focus on decreasing pain intensity, frequency, and duration have not been effective in improving function and quality of life. Nursing care of such individuals and families needs to be holistic and begins with treating the pain as real and an assessment of pain's impact on all domains of a child's life including

the parents' ability to cope. An interdisciplinary approach to chronic pain management is linked to improvements in function and quality of life.

Now do time out 4.

4 Reflective account

Time out Now that you have finished the article you might like to complete the questionnaire on page 35. You can also write a reflective account of between 750 and 1,000 words. Go to the Nursing Children and Young People website, at rcnpublishing.com/r/ncyp-reflective-account, to find out more.

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