



## Review Article

## Japanese clinical guidelines for chronic pain in children and adolescents

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**Abstract** Chronic pain is a common problem in pediatric practice. The prevalence of chronic pain in children is >30%. Because pain indicates emotional expression as well as the physiological reaction toward infection, injury, and inflammation, both physiological and psychological assessments are essential to determine primary interventions for chronic pain. The Japanese Society of Psychosomatic Pediatrics Task Force of clinical practice guidelines for chronic pain in children and adolescents compiled clinical evidence and opinions of specialists associated with the primary care of pediatric chronic pain in the Japanese 'clinical guidelines for chronic pain in children and adolescents' in 2009, which are presented herein. The guidelines consist of three domains: general introduction to chronic pain; chronic abdominal pain; and chronic headache. Each section contains information on the physiological mechanism, psychological aspects, assessment methods, and primary interventions for pediatric chronic pain. These guidelines are expected to help disseminate knowledge on primary interventions for chronic pain in children and adolescents.

**Key words** analgesic drug, chronic pain in children and adolescents, clinical guidelines, psychosocial development.

### Why are clinical guidelines for chronic pain in children and adolescents necessary?

Chronic pain is a common symptom in pediatric practice. The prevalence of chronic pain in children and adolescents is 4–37%.<sup>1–5</sup> van Dijk *et al.* reported that >50% of children between 9 and 13 years of age experienced chronic pain at least once, which was conducted in Canada.<sup>2</sup> The most common types of pain are limb pain, headache, and abdominal pain.<sup>2–4</sup> Because pain in children and adolescent varies from slight or transient pain such as a minor bump or cuts to severe or persistent

pain such as cancer pain or neuropathic pain, pediatric practitioners should correctly evaluate the origin and levels of pain.

Pain can be classified as acute or chronic. Acute pain is one of the most common adverse events occurring as a result of injury, illness, and medical procedures and is associated with increased anxiety, avoidance, somatic symptoms, and increased parental distress.<sup>6</sup> It is often accompanied by objective physical signs of autonomic nervous system activity.<sup>7</sup> Chronic pain was formerly defined as pain lasting >6 months, but the International Association for the Study of Pain (IASP) classified chronic pain as lasting: <1 month; 1–6 months; or >6 months.<sup>8</sup> Chronic pain in children is the result of a dynamic integration of biological processes, psychological factors, and sociocultural context, within a developmental trajectory.<sup>7</sup> This category includes persistent and recurrent pain with possible fluctuations in severity, quality, regularity, and predictability.<sup>7</sup> Cancer pain and neuropathic pain are persistent, but psychosomatic and psychosocial symptoms such as headache or abdominal pain related to emotional disturbance

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are often intermittent or recurrent. In these guidelines, we mainly discuss recurrent pain in children and adolescents.

Standardized strategies for chronic pain in children and adolescents, however, have not been established in Japan to date. This indicates that the initial treatment of chronic pain is dependent on the practitioner's individual experience when there is no obvious abnormal finding on physical and routine examinations. If appropriate treatment is not received, however, and the patient deteriorates while waiting for treatment, quality of life may be impaired.<sup>9–12</sup> Thus, the Japanese Society of Psychosomatic Pediatrics task force of clinical practice guidelines for chronic pain in children and adolescents collected evidence and specialist opinions about chronic pain and proposed clinical recommendations in the Japanese 'clinical guidelines for chronic pain in children and adolescents' in 2009.<sup>13</sup> These guidelines consist of three domains: general introduction to chronic pain; chronic abdominal pain; and chronic headache.<sup>13</sup> Each domain includes information on the physiological mechanism, psychological aspects, assessment, and primary interventions for pediatric chronic pain. In this report, we present the 'general introduction to chronic pain' section and a summary of 'chronic abdominal pain' and 'chronic headache' to understand the meaning of and primary interventions for chronic pain in children and adolescents.

## Meanings and mechanisms of chronic pain in children and adolescents

### Definition of pain

The most comprehensive definition of pain is 'unpleasant sensation and emotional experience associated with a real or potential damage to tissue or the equivalent of such damage', as provided by the IASP.<sup>14</sup> Because pain is determined by both pathophysiological and psychological components, objective assessment of pain is initially difficult, even in adults. Moreover, complaints of pain imply appeals for help in younger children who cannot verbalize and cope with pain themselves. It is impossible to separate psychological factors from somatic origins of chronic pain in younger children.

### Pathophysiology of pain

Pain is an essential early warning device that alerts us to the damaging stimuli in the environment.<sup>15</sup> Physiological pain, generated by noxious stimuli, is initiated by specialized sensory fibers innervating the peripheral tissues.<sup>15</sup> Peripheral activation of nociceptors is modulated by a number of chemical substances produced or released when cellular damage occurs.<sup>16</sup> Peripheral sensitization represents enhanced responsiveness and a reduced pain threshold by repeated stimulation.<sup>16</sup> Further, pain is a complex experience that involves not only noxious stimuli but also cognitive and emotional processes within the brain.<sup>17</sup> Noxious stimuli in peripheral tissues are transmitted to central pain pathways, and the brain interprets these signals to produce the sensation of pain. The signal of pain is transmitted from brainstem areas through descending pain pathways. Because opioid peptides, serotonin, and norepinephrine are the main

transmitters of the descending pathways, selective serotonin re-uptake inhibitors and tricyclic antidepressants have analgesic properties that reduce pain.<sup>16</sup>

### Characteristics of pediatric chronic pain

A feature of pediatric pain is that developmental factors are essential. The localization and prevalence of chronic pain in children vary among different age groups. Abdominal pain is common in toddlers (4–7 years), headache in those >12 years, and limb pain in children between 8 and 15 years of age.<sup>3</sup> Moreover, the definition of pain is influenced by developmental factors.<sup>7</sup> Recurrent migraine headache that lasts for 1 h in a 4-year-old child is a typical phenomenon, whereas a headache lasting this long in adolescents is not likely to be classified as a migraine.<sup>7</sup> Practitioners must consider the age and developmental factors when evaluating chronic pain in children and adolescents.

### Psychological perspectives of chronic pain

Another aspect of chronic pain is the contribution of psychological factors. Chronic pain is a syndrome with consequences such as physical and psychological impairment.<sup>18</sup> Complaints of chronic pain are associated with psychological and psychosocial factors such as cognitive function, school performance, affective problems, family structure, family functioning, and socioeconomic status.<sup>18–20</sup> As a mechanism for psychological factors causing chronic pain, Balottin *et al.* hypothesized that, in the process of developing migraine, psychological factors can act in two different ways: either as a predisposing factor, inducing a chronic state of anxiety or depression (even subclinical), or as a trigger factor, activating a cascade of psychological events that, in turn, activate the biological mechanisms that produce the migraine attack.<sup>21</sup> This hypothesis may be applicable to other types of chronic pain.

Classical conditioning according to Pavlov and operant conditioning in the work of Skinner also explain the relationships between complaints of pain and the response of surrounding people. According to operant conditioning, a behavior increases in frequency if reinforced, and a decrease follows if this behavior is not rewarded or punished.<sup>18</sup> For example, if a child cries too much for a minor bump and his parents give them gifts to stop crying, the complaint of pain is reinforced by the parents' behavior and the frequency of pain will increase. Therefore, the idea of mind – body dualism must be abandoned.<sup>7</sup> In terms of appropriate treatment, it is crucial to evaluate physical, psychological, and developmental factors.

### Meaning of pain for children from the perspective of their psychological development

The experience of pain is important for a child's psychosocial growth. Children experience pain of various kinds and levels as a result of organic dysfunction, injury, and fights as they grow. Each episode of pain provides an opportunity for learning about how to cope with pain, either magnifying or reducing the distress.<sup>22</sup> Children learn self-control through their attempts to reduce pain such as cooling a painful lesion, resting, or distracting themselves by taking their minds off their worries. In

addition, they learn to build mutual trust with others through the experience of coping with pain. When children experience pain and cry a lot, adults will provide either encouragement or relief. If the pain is reduced by such encouragement or psychological support, the child will acquire feelings of self-control to combat pain and self-confidence. Thus, although pain can be harmful for children, it also provides learning, as part of psychosocial growth, and the development of social skills needed to help others.<sup>23</sup>

### Assessment of pain in children

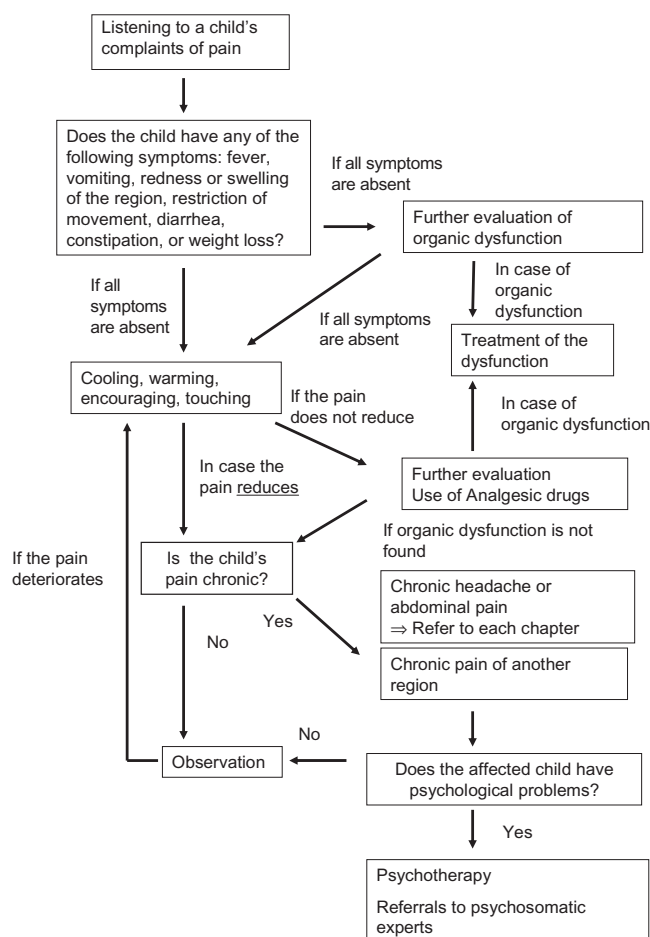
Evaluation of children with pain should include consideration of biological, psychological, and sociocultural factors in a developmental context.<sup>24</sup> For a proper evaluation, appropriate assessment of pain is essential. Pain can be assessed using self-reports, behavioral observations, or physiological parameters depending on the age of the children and their communication capabilities.

#### Application of, and convenient tools in self-report methods of pain in children

The self-report method is used in cases of mature children who can accurately report the location, quality, intensity, affective elements, and tolerability of pain.<sup>25</sup> Children as young as 3 years of age can accurately express and identify pain with the help of pain assessment scales.<sup>26</sup> Measurement tools such as the visual analog scale (VAS),<sup>26</sup> the Faces pain rating scale based on facial expressions,<sup>27</sup> and color analog scales<sup>28</sup> help children express their pain. The VAS is regarded as the gold standard for assessing pain in adults and has been found to be effective in children from 5–6 years on. The traditional scale is a 10 cm scale marked at 1 cm intervals from 0 to 10. Zero denotes 'no pain' and 10 denotes 'excruciating pain'. A patient is asked to identify a marking on the scale that corresponds to his/her degree of pain. The Faces pain rating scale is widely used for children aged  $\geq 3$  years.<sup>2</sup> Six types of pictures of faces are drawn horizontally. The face at the right end is crying, while that at the left end is laughing. The expression of the six faces changes gradually. The score and levels of pain are written under each face. The left-most face is numbered 0, indicating 'no pain', and the right-most face is numbered 5, indicating that it 'hurts worst'. As with the VAS, the patient is asked to choose one picture that corresponds most appropriately to their expression of pain.

#### Behavioral observations and physiological parameters of pain in children

When children cannot report their pain accurately because they either are too young to communicate or have cognitive impairments, behavioral observations or physiological measurements are used to assess pain. The physiological parameters heart rate, respiration rate, blood pressure, palm sweating, cortisol levels, and skin oxygen saturation levels have been used in conjunction with facial expressions or position of extremities in pain scales.<sup>25,29–31</sup> A common pain scale, the Children's Hospital of Eastern Ontario Pain Scale (CHEOPS), was originally developed for the assessment of postoperative pain in children<sup>32</sup> and is now



**Fig. 1** Algorithm for determination of diagnoses of chronic pain in children and adolescents.

widely used in pediatric clinical practice. It consists of six observation items, including 'cry', 'facial', 'child verbal', 'torso', 'touch', and 'legs.' A score of 0–2 points is provided for pain behavior concerning each item, and the CHEOPS score is calculated as the total score for each item. Because every child has an individual strategy for coping with pain, assessment of pain based only on behavioral observations can be misleading. Thus, in addition to using a pain assessment scale, physiological parameters should be considered.<sup>26</sup>

### Primary interventions for pediatric chronic pain

#### Algorithm for determination of diagnoses of chronic pain in children and adolescents

Figure 1 is an algorithm for diagnosis and determination of primary interventions for chronic pain in children and adolescents.<sup>13</sup> First, it is necessary to eliminate any finding caused by injury, infection, or inflammation such as sweating, swelling, color or temperature changes, or restricted range of motion of the affected region. In cases in which such findings are confirmed, examination for a physical disease should be performed. If there are no abnormal findings, primary intervention should begin by educating the children and their parents about the origins and

mechanisms of pain and non-pharmacological treatments such as cooling, warming, touching, or encouraging. The lack of abnormal findings on routine physical examination, however, does not immediately suggest a psychological origin of pain; functional disturbances such as heightened visceral sensations following a gastrointestinal pathology are still possible.<sup>33,34</sup> As the first step, it is important that the practitioner listens to the complaints of the child and provides accurate information about the mechanisms and appropriate treatments for pain to help the patient cope better with the situation and encourage better compliance with the recommended care.<sup>23</sup>

If the pain worsens or does not reduce, the practitioner should re-examine the child for a physical disease and also consider psychological or psychiatric comorbidities that can cause pain, such as depression, anxiety syndromes, somatoform disorder, hypochondria, and schizophrenia.<sup>35</sup> Psychological factors relating to family members, particularly mothers, such as depression or anxiety, are also related to pain experienced by children;<sup>36,37</sup> education about pain is inevitably important in such cases. If it is suggested that psychological factors are closely related to chronic pain, implementation of psychotherapy is recommended. Various psychological interventions are described in the research and clinical literature: distraction, play therapy, psychoeducational approaches, hypnosis, biofeedback, and guided imagery.<sup>38</sup> The goal of psychological interventions is to shift children from a helpless state of anxious pain in which they passively receive pharmacological and other interventions to a more adaptive state of empowerment and control.<sup>39</sup>

Because chronic pain is a complex experience of biological factors, emotional status, sociocultural context, and developmental factors, the mind – body dualism that strictly distinguishes psychological contributions from physical conditions is of no consequence in this type of pain.<sup>7</sup> Maintaining this dichotomy is harmful because such faulty thinking leads to overmedication (inappropriate investigations, procedures, and interventions) or insufficient acknowledgement of the child's multidimensional experience and underlying neuropathy.<sup>7</sup> When practitioners evaluate chronic pain in children and adolescents, they should have an understanding of the holistic medical approach.

In cases of chronic headache or abdominal pain, it is recommended that the practitioner refer to the chapters on headache and abdominal pain in the guidelines.<sup>13</sup>

### Non-pharmacological treatment

For chronic pain in children who do not present with objective signs of a disease on physical examination, non-pharmacological methods should be recommended as a priority.<sup>26</sup> Instead, physical methods such as touch (including stroking massage, rocking, and vibrating), local applications of objects providing cool or warm sensations, and controlled deep breathing, and cognitive methods such as distraction (singing or reading to the child, listening to the radio, performing a play activity, or imagining a pleasant place) can be used. Learning how to cope with chronic pain results in the development of self-confidence and self-efficacy (the belief that 'I can deal with this myself') in children. Practitioners should teach children that they can change their frame of

**Table 1** Pharmacological treatment for children and adolescents with chronic pain<sup>13</sup>

Drugs	
First-line drugs (NSAIDs)	
Acetaminophen	10–15 mg/kg every 6–8 h
Ibuprofen	5–10 mg/kg every 6–8 h
Specific pharmacotherapy <sup>†</sup>	
Abdominal pain	Adjuvant drugs, anticholinergic agents
Headache	NSAIDs, triptans
Chronic pain with depressive disorders; tricyclic antidepressants, selective serotonin re-uptake inhibitors, serotonin and norepinephrine re-uptake inhibitors	
Other agents	Anticonvulsants, Chinese medicine

<sup>†</sup>Dosage for children is not fixed.

NSAIDs, non-steroidal anti-inflammatory drugs.

thinking from 'I cannot do anything for my pain' to 'I can do something even if there is pain'.<sup>40</sup>

### Pharmacological treatment

When pain relief is not achieved adequately with non-pharmacological treatment, analgesic drugs are used. Even if the pain is functional and not serious but disturbs the child's daily life, relieving pain with medicines is important. In contrast, if the child is happily playing although there is an injury and inflammation but the degree of injury is not serious, pharmacotherapy is not necessary.

Frequently used drugs and recommended dosage regimens are listed in Table 1.<sup>13</sup> As the first-line therapy, analgesic agents such as acetaminophen and ibuprofen are recommended because of their safety profiles.<sup>7,25,26</sup> The current recommendation for acetaminophen is an oral dose of 10–15 mg/kg every 6–8 h; that for ibuprofen is an oral dose of 5–10 mg/kg every 6–8 h. In the case of chronic headache or abdominal pain, specific drugs, for example, triptans and anticholinergic agents, are recommended. Furthermore, adjuvant medications can be used in conjunction with analgesics,<sup>21</sup> including antidepressants, anticonvulsants, Chinese medicine, and other agents. The use of opiates for non-malignant chronic pain is debatable;<sup>36</sup> they are generally reserved for treatment of painful syndromes related to cancer, injury, or other acute types of pain.<sup>6,27,35</sup> The use of opiates is not recommended for the types of chronic pain described in the present guidelines.

### Aims of primary intervention for pain in children and adolescents

The aim of primary intervention is not complete elimination of pain. Instead, it should achieve the following four aims (Table 2): increased pain tolerance; increased feeling of self-control;

**Table 2** Aims of primary intervention for chronic pain in children and adolescents

1. Development of improved pain tolerance
2. Acquiring of a feeling of self-control
3. Active participation in activities of daily living
4. Good adjustment to his/her social life

improved activities of daily living; and appropriate adjustments to social life.<sup>13</sup> It is important that neither the children and parents nor the practitioners become extremely involved with the pain. Children become self-efficient by participating in social activities and performing activities of daily living while controlling the pain themselves. The role of pediatric practitioners is not to eliminate pain completely but to encourage children to control pain themselves.<sup>13</sup>

### Conclusion

In this report, we introduce the Japanese clinical guidelines for chronic pain in children and adolescents, edited by the Japanese Society of Psychosomatic Pediatrics. We hope to disseminate knowledge regarding the primary interventions for chronic pain in children and adolescents among pediatric practitioners. The most important aspect of these guidelines is that the experience of coping with pain is important for the psychosocial growth of children. Pediatric practitioners should not focus on complete diminishment of pain by drugs because excessive use of pain-relieving drugs can possibly result in substance abuse. Instead, children should be educated as to the nature of pain and the proper strategies for treating chronic pain; they should also be encouraged to learn how to cope with their pain.

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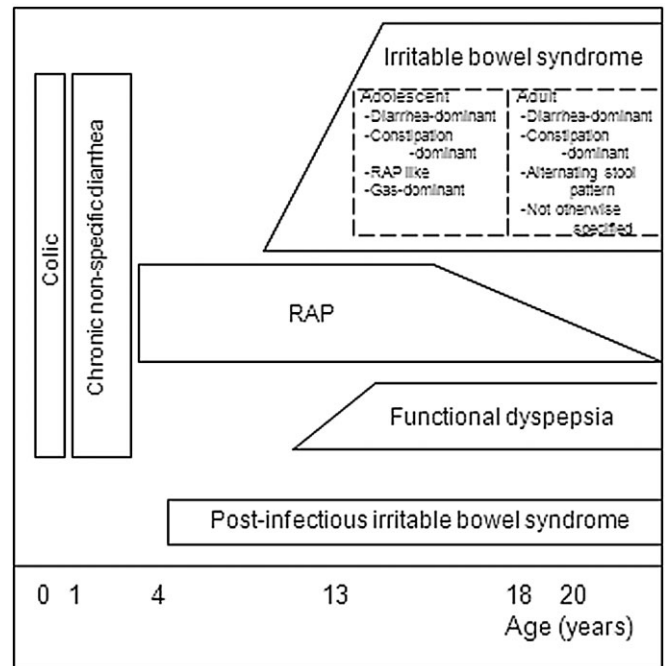
## APPENDIX I

### Essentials in primary intervention of chronic abdominal pain and headache in children and adolescents

We presented the 'general introduction to chronic pain' in this article. Here, we describe the outlines of the remaining two chapters, 'chronic abdominal pain' and 'chronic headache'.

#### Chronic or recurrent pain in the lower abdomen in children

Chronic or recurrent abdominal pain is a common disorder in children and adolescents and is estimated to affect 10–20% of school-aged children.<sup>41–43</sup> There is room for discussion with regard to definition and classification. In the 1950s, Apley and



**Fig. 2** Functional gastrointestinal disorders in children and adolescents. RAP, recurrent abdominal pain.

Naish introduced the term 'recurrent abdominal pain' (RAP) for pain in children that waxes and wanes, and occurs for at least three episodes within 3 months, which is sufficient to affect the child's activities in the severity.<sup>44</sup> Rome criteria defined functional abdominal pain with alteration of bowel movement as irritable bowel syndrome (IBS).<sup>45</sup> In 2005, Subcommittee on Chronic Abdominal Pain of the American Academy of Pediatrics stated that the term RAP should be retired,<sup>46</sup> because this definition is ambiguous and includes both physical disease and non-organic causes. Abdominal pain in early childhood, however, often seems to be related to both physical origin and psychosocial factors.<sup>13</sup> Continuity between RAP and IBS has been suggested,<sup>47</sup> and RAP in infants shifts to IBS after adolescence. Moreover, diagnosis by exclusion has been routinely performed, and the term RAP is used by both practitioners and patients in Japan.<sup>13</sup> Therefore, we use the term RAP for chronic or recurrent abdominal pain in early childhood, and IBS for those in adolescence in the Japanese guidelines (Fig. 2).<sup>13</sup>

For children with both RAP and IBS, the primary intervention should begin with non-pharmacological therapies such as education for patients and their parents about the pathophysiology of abdominal pain, importance of regularity of sleep and defecation, avoidance of caffeine, cold meals and a high-fat diet. In the case that the symptoms do not reduce, pharmacological treatment should be used together with non-pharmacological treatment.<sup>13</sup>

#### Chronic headache

Chronic headache becomes prevalent in adolescence, whereas chronic abdominal pain is common in younger children.<sup>3</sup> In a pediatric practice, it is necessary to begin with distinguishing

primary from secondary headache caused by critical diseases such as brain tumor, metabolic diseases and the other organic diseases.<sup>13</sup> The second step toward diagnosis is differentiation between migraine, tension-type headache (TTH) or complex type, most commonly seen as primary headaches in children and adolescents, according to clinical symptoms. Migraine is characterized by typical features, such as unilateral location, pulsating quality, moderate or severe intensity, aggravation by routine physical activity, and association with nausea and/or photophobia and phonophobia.<sup>48</sup> In contrast, TTH is diagnosed by absence of features found in migraine,<sup>49</sup> that is, pain appears bilaterally

without pulsatility, persisting for a long period, but not affected by body motion.

Primary intervention for migraine and TTH should be combined education and analgesic agents. First, practitioners should try to reduce patient anxiety and that of the parents by explaining that the headache is not mortal. Education consists of sleeping and eating habits, importance of exercise, and psychological and environmental factors that induce headache. Effective and safe analgesics for headache in children and adolescents are ibuprofen and acetaminophen.<sup>50</sup> In addition, nasal triptan is recommended for use for acute treatment in adolescents.<sup>50</sup>