Headaches in Children

School Nurse Curriculum
2009
Majority of children (75%) referred for child neurology headache evaluation and management have migraine. Younger boys and girls are affected equally, as they grow older, girls outnumber boys. This is likely due to hormonal influences.

The inheritance pattern of headaches and migraines is complex. It is estimated that 80 – 90% of children with migraine will have a parent with a similar history.
Children as young as 3-4 years can have acute migraine headaches, although symptoms may be difficult to recognize.

Recent increase in prevalence explanation includes increased awareness, increased healthcare utilization for migraines, improved pharmacotherapeutic options, and changes in the social environment. (Lipton, 1996)
Once a thorough evaluation excludes an acute or chronic illness beyond headache, attention turns to pain and symptom management.

Parental Concerns

- Cause of headache – 70%
- What will make it better – 68%
- Reassurance that a life threatening illness is not present – 59%

(Lewis et. al., 1996)
Children’s Thoughts on Headache

- “It feels like my heart is beating in my head…” 10 year old
- “All I want to do is hurl….” 12 year old
Childhood headaches and migraines differ from adult in several ways. Typically, the migraine “attacks” are shorter, holocephalic, and may be as a result of minor head trauma. Headaches in young children may be more difficult to recognize. Irritability, head banging, head holding, sensitivity to sound or light may all be indications of head pain in the younger child. Older children who are verbal generally are able to articulate their pain location and characteristics.
Pathogenesis/Pathophysiology

- Vascular Theory
  - Aura caused by intracerebral vasoconstriction
  - Headache caused by reactive vasodilatation

*But…*
- Does not explain prodrome
- NSAIDS can be effective, but not a vascular drug
- Most patients do not have aura

Vasoconstriction causes focal neurologic signs, vasodilation follows which causes pain.
This theory postulates that afferent inputs to the brain stem result in slowly spreading cortical neuronal “depression” that is followed by vasomotor dysregulation, vasodilatation, and inflammation of the cranial vasculature innervated by the trigeminal nerve.
Agonists and antagonists to a variety of subtypes of serotonin receptors appear to be important in symptomatic relief of acute migraine attacks and prophylaxis. A transient rise in dopamine also is postulated to play a role in headache. (Rosenblum and Fisher, 2001)
Recurrent headaches can be comorbid and cause these symptoms and others. (Fisher, 2001)
Tension headaches are classified as acute recurrent headaches until and unless they reach a frequency of about 10-15 times per month.

Classification of headaches is complex and controversial. The International Headache Society recognizes specific criteria for defining migraine in children. The IHS (1988) developed diagnostic criteria and classification of headache disorders to improve consistency and reliability of diagnosis among clinicians. Other classification systems use the temporal pattern of the headache.
Headache Frequency Differential

HEADACHE TYPES

SYMPTOMS

TIME (days)

Acute
Recurrent
Chronic Progressive
Chronic Nonprogressive
Mixed
Medication overuse headache
Rebound headache
Transformed migraine
Headache triggers are very individualized. A child may “react” to something that is not a typical trigger. Food triggers occasionally are implicated in migraine but generally the trigger is never identified. Parents commonly attribute their child’s headaches to sinusitis or the need for corrective lenses. In reality, these conditions account for a small percentage of childhood migraines. Other causes of headaches include infectious processes, dental disease, head trauma.

Caffeine is a notorious “stealth” trigger; children and families may be unaware of its presence in many sodas in addition to cola. Also the popularity of gourmet coffee drinks may add large amounts of caffeine to a child or teen’s daily intake. (Rosenblum and Fisher, 2001)
Children with headaches and their parents generally seek attention from health care providers when the headaches increase in frequency and/or severity. An accurate description of symptoms is necessary to understand headache acuity and to develop an appropriate strategy for evaluation and management.

Determining level of disability from headache is key. This can be determined by eliciting information about school attendance and participation in previous extracurricular activities (e.g. sports). Then, the headache pattern must be assessed. This can be elicited by determining the longest period without symptoms.

The efficacy and frequency of use of analgesics is also an important area of assessment. Overuse of analgesics can result in rebound headaches and is often a factor in ongoing headache issues.

A thorough description of headaches should include type, location and pain quality—throbbing, pulsating, stabbing, dull, achey, steady, tight band, radiating, etc. A pain scale of 1 – 10 may be used although sometimes is counter-productive.

Continued assessment includes associated features such as aura, numbness, dizziness, nasal congestion, slurred speech, tearing, nausea, vomiting, vision changes, balance problems, sound or light sensitivity, and activity at the time of onset.

Headache triggers in children can include sunlight, over programming, odors, lack of sleep, menses, seasons, foods, caffeine, exercise, food additives, illness, test or performance anxiety and many more.
Headache Classification

Temporal Pattern - Acute Recurrent

• Tension Headaches
• Migraine Headaches
  – Common migraine (without aura)
  – Classic migraine (with aura)
  – Other migraine variants, complicated migraine
The International Headache Society classification of headache disorders has now recognized specific criteria for defining migraine in children.

Although the majority of children presenting in child neurology present as primary migraine headaches, children can have other types of headache. These include tension, chronic daily headache, or mixed headache. A smaller percentage of children have secondary headache due to structural pathology (e.g. tumor) or traumatic event (e.g. head injury).
Please refer to references for further definitions of tension and other types of headache. Many children, especially teens, will present with features of intermittent migraine against a backdrop of chronic daily headache. Treating these children and teens can be challenging. It is important to ask about how many different types of headaches the child has. A mixed headache picture implies multifactorial etiology.
Pain free intervals should occur. Migraines are characterized clinically by debilitation and pain.

Migraine Headache

- Often begins with sensory, motor, or visual symptoms (classic)
- Visual prodromes can include hemianopsia, transient blindness, fortification spectra, and blurred vision
- Can last minutes to days
Tension Headache-Episodic

IHS Classification

• At least 10 episodes
• Lasts 30 minutes to seven days
• Has two of the following characteristics
  – Bilateral location, pressing/tightening quality, mild or moderate intensity, not aggravated by routine physical activity
• Both of the following
  – No nausea, photophobia OR phonophobia
• Not attributed to another disorder
Tension Headache-Chronic

IHS Classification

- Occurs >15 days per month
- Lasts hours or may be continuous
- Has two of the following characteristics
  - Bilateral location, pressing/tightening quality, mild or moderate intensity, not aggravated by routine physical activity
- Both of the following
  - Photophobia OR phonophobia, mild nausea
- Not attributed to another disorder
Differentiation between migraine and tension headache may be difficult but is unnecessary. The two blend along a spectrum of head pain and are managed the same way.

**Headache Classification**

- Tension Headache Characteristics
  - Can be infrequent or daily
  - Dull pain, “band-like” around head
  - Head, face, neck pain, diffuse location
  - Initially relieved by over-the-counter drugs
  - Nausea and vomiting rare
  - Stress related, also may be associated with depression, fatigue
Headache - Acute Generalized - DDx

- Systemic infection
- CNS infection
- Toxins: lead, CO
- Electrolyte imbalance
- Hypertension
- Hypoglycemia
- Post-lumbar puncture

- Trauma
- Arterial dissection
- Thromboembolism
- Hemorrhage
- Collagen-vascular disease
- Post-seizure (rarely)

DDx=differential diagnosis
Headache - Acute Localized - DDx

- Sinusitis
- Otitis
- Ophthalmologic abnormality
- Occipital defect (e.g., platybasia, Chiari malformation, Klippel-Feil syndrome)
- Temporo-mandibular joint dysfunction

Check spelling of temporo.
Headache - Acute Recurrent - DDx

- Tension
- Migraine
- Exertional
- Paroxysmal hemicrania
- Cluster
- Complicated migraine
- Migraine equivalent
Headache - Chronic Progressive-DDx

- Tumor
- Pseudotumor cerebri
- Brain abscess
- Subdural hematoma
- Hydrocephalus
- Arachnoid cyst (rarely)
This type of headache often starts as ambiguously described intermittent but increasing tension headaches or migraines. Often the pain is described as being constant. A specific case for these headaches is rarely found. In some cases, despite being excellent students, grades fall and academics decline. This problem can stem from three factors. First, the child and family focus on pain and treatment rather than schoolwork, assuming the problem will be temporary. Second, the number of school days missed can become so great that the child is not able to keep up. Third, secondary gain may be present, as the child stays home rather than attending school. In the absence of focal neurologic findings, coexistent emotional or behavioral concerns must be addressed.

Analgesic rebound or “drug-induced refractory headaches” are a less common but important cause of chronic non-progressive headaches. These headaches are the paradoxical consequence of analgesic overuse. Analgesics must be tapered slowly and then discontinued. Prophylactic therapy is often useful during the tapering period.
Brain Tumor Headaches

- Severe, incapacitating pain, often increasing in frequency or severity
- Headache that occurs in the absence of previous headache or change in chronic headache pattern
- Vomiting that is persistent, increasing in frequency, or preceded by recurrent headache
- Occipital or frontal, often focal
- Awakens from sleep or pain on arising
- Worse with valsalva-like maneuvers
- Negative family history for migraine
- Associated neurologic findings
These symptoms can be indicative of a serious illness such as a brain tumor and must be evaluated immediately.
Comparison of past headache patterns with current and noting the frequency and severity of symptoms can be helpful.
The abortive approach centers on the use of analgesics, anti-inflammatory, and anti-emetic medications. Acetaminophen and ibuprofen are first-line medications in most cases. These are also the most common culprits in drug-induced rebound headaches. Serotonin receptor agonists are able to penetrate the blood-brain barrier and bind to neurons in the brainstem.

Delivery systems of abortive medication have made progress in the past decade. Various medications are available in injectable, nasal spray, and sublingual preparations. Adverse effects are generally minimal but may include fatigue, dizziness, sedation.

Caffeine, while a migraine trigger, can also be used judiciously in the treatment of headaches and migraines.
Headache Management

- Pharmacologic Treatment - Abortive
  - Newer anti-migraine medications
    - sumatriptan (Imitrex®)
    - zolmitriptan (Zomig®)
    - naratriptan (Amerge®)
    - rizatriptan (Maxalt®)
  - Penetrate blood brain barrier, bind to neurons in trigeminal nerve in brainstem and upper cervical cord

NOTE: FDA approval for use in children is not present for each medication at this time.
Prophylactic therapy is given on a daily basis, regardless of whether a headache is present. Cyproheptadine is useful in younger children but less effective in those over about age 8 years. Side effects include fatigue. In general it is well tolerated.

Amitriptyline and nortriptyline have historically been used as antidepressants but are now gaining popularity as anti-migraine medications. Side effects include fatigue.

Valproic acid, gabapentin, and topiramate are antiepileptic medications with excellent effectiveness for prophylactic migraine management.

Side effects of valproic acid can include weight gain, hair loss, and incontinence. Topiramate has the unique side effect of weight loss due to a change in metabolism. Gabapentin may cause slight fatigue but generally has a low side effect profile.

Classifications of prophylactic medications include:

- **Beta blockers** – propranolol, atenolol
- **Calcium channel blockers** – verapamil
- **Tricyclic antidepressants** – amitriptyline, nortriptyline, doxepin
- **Anti-histamines** – cyproheptadine
- **Anticonvulsants** – valproic acid, gabapentin, neurontin, topamax
- **Other** – magnesium oxide, vitamin B6 (pyridoxine), vitamin B2 (riboflavin)
- **Antiemetics** – promethazine, ondansetron
- **Caffeine compounds** – ergotamine and caffeine, butalbital, fiorinal, fioricet, phrenilin, dihydroergotamine
- **Other** – ketorolac IM, isometheptene mucate/dichloralphenazone/acetaminophen (Midrin PO)

**NSAIDS** – ibuprofen, naproxen
Prophylactic medications are generally used on a short term basis to break the headache “cycle”. Children will often take prophylactic medications for 3-6 months. If a desirable decrease in migraines results, the child can be weaned from the medication. If migraines return, the medication can be restarted. However, often once the cycle of frequent migraines is interrupted, future headaches can be effectively treated with abortive medications only.

Headache Management

- **Prophylactic Treatment**
  - Used if frequency is >3-4 times per month
  - Goal is to reduce frequency, severity, and length of headache
  - Given on daily basis whether or not headache is present
  - 50% of children show improvement in 6 months
Treatment based solely on medication is not in the best interest of this group of patients. Counseling, relaxation therapy, and coping strategies may be of use in addition to referral to a psychologist or psychiatrist.
The overuse of analgesic medications such as acetaminophen and ibuprofen can cause drug induced refractory or “rebound” headaches. Children (and adults) should take OTC medications no more than 3-4 times per week to avoid this. If rebound headaches occur, they can be very difficult and painful to alleviate, in the worst cases requiring hospitalization and intravenous medication. If an individual is taking these medications more frequently, they are likely a good candidate for prophylactic daily medication.

OTC medications and prescription medications should be dosed appropriate to weight and age. It is difficult to assess the utility of a medication if dosing is subtherapeutic. All medications should be titrated to a weight appropriate maximum dose to assess whether or not it is effective, PRIOR to switching to another medication.

If the headaches do not respond to any medications tried (usually 3 or greater), other avenues of treatment should be explored.
Non-pharmacologic therapies

Who is a good candidate?
• Poor candidate for drug treatment
• Medical contraindications
• Inadequate response to drug treatment
• Preference for non-drug intervention
• Hx frequent/excessive use of analgesics or other acute medications
• Significant life stress or ineffective stress-coping skills

Penzien and Gabb, 2003
Headache management is a slow process and often will take 1-2 months to see results. Most prophylactic headache medications have a “ramp-up” time of 2-4 weeks before results can be expected. Additionally, lifestyle changes (increased exercise, habilitation back to usual activities, weaning from OTC abortive medications) is a process. Family involvement and support is important.
Minimizing the use of analgesic medications and “re-normalizing” the family lifestyle are important factors in the effectiveness of non-pharmacologic migraine management. Treatment based solely on medication is usually not in the best interest of the patient and family.

Non-pharmacologic treatments that have been used effectively include biofeedback, stress reduction techniques, referral to multidisciplinary pain clinic, psychotherapy, and psychiatric assessment and treatment.
Process Oriented Headache Assessment for the School Nurse
The Healthy Learner Model (HLM) for Student Chronic Condition Management is used to bridge gaps observed in medical models of disease management and programs that focus only on the environment at school. The Healthy Learner Model is an integrated, coordinated effort to optimize the health status and support the academic success of children with chronic conditions (Erickson, Splett, Mullett & Heiman, 2006).

The synergistic elements of the HLM are: 1) leadership, 2) evidenced based nursing practice, 3) capacity building, 4) resource nurse, 5) the healthy learner, 6) partnership with parents and 7) partnership with health care providers. Leadership, from the school and community, is responsible for promoting the vision across systems and securing the resources needed to manage the chronic illness. Evidence-based practice in nursing is the process of combining the best evidence available with nursing experience and patient/family preferences to determine the interventions for optimum outcomes (Adams & McCarthy, 2005).

The aim of the HLM is to enable students with chronic conditions to be healthy, in school, and ready to learn (Erickson, Splett, Mullett & Heiman, 2006). The HLM has been replicated for use with asthma management and ADHD management.
Description of Symptoms

- What symptom(s) is/are the student demonstrating?
- Does the child have a diagnosis of headaches or other neurologic disorder? What is the classification?
- Is the child on medication for headaches? Other medications?
- What is seen at school and under what circumstances?
Children with headaches and their parents generally seek attention from health care providers when the headaches increase in frequency and/or severity. An accurate description of symptoms is necessary to understand headache acuity and to develop an appropriate strategy for evaluation and management.

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A thorough description of headaches should include type, location and pain quality – throbbing, pulsating, stabbing, dull, achey, steady, tight band, radiating, etc. A pain scale of 1 – 10 may be used although sometimes is counter-productive.

Continued assessment includes associated features such as aura, numbness, dizziness, nasal congestion, slurred speech, tearing, nausea, vomiting, vision changes, balance problems, sound or light sensitivity, and activity at the time of onset.

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### Description of Symptoms

**Identify:**

- Headache classification and general status
- Longest headache-free period
- Date and description of last headache
- Typical frequency, location, pain quality, triggers, timing, duration, pattern, level of disability
- Medication use

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[Image: Description of Symptoms table]

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If red flags are present, refer to PCP or ED immediately.

**Description of Symptoms – Action Plan**

- Review follow-up guidelines with family
  - Worsening in intensity, duration, frequency
  - Red flags
    - Double vision, vomiting, occipital pain, weakness, ataxia, stiff neck, neck pain
    - Altered mental status, focal neurologic symptoms, abnormal VS
- Facilitate follow-up with child neurology provider if needed
Starting a headache calendar or diary often enables the child and family to visualize how foods or other triggers may affect migraine frequency. Often families will find that it is not food, but a change in sleep pattern or routine that triggers a migraine. Also, families find that a specific food is not a trigger, but lack of food and water at frequent intervals throughout the day can contribute to onset of headache. Children who are prone to headaches often need a morning snack and must be permitted to keep water with them at their desk at school. Neurology providers always recommend that children eat an appropriate breakfast and lunch with the hope of moderating headaches through regular food and hydration.
Headaches in children are often treated with rescue or abortive medications which are used when needed, and prophylactic medications, which are taken daily. Each child may respond differently to the same medication. It is helpful to have an understanding of the characteristics and interactions of the different medications to guide the assessment process. Assessment should include the name of the drug, strength, formulation, route of administration, dose, compliance signs and symptoms of drug toxicity or side effects, and recent changes in body weight.

The use of PRN, OTC or other substances must also be reviewed. Co-morbidities must also be identified. For example, children with certain cardiac conditions should not use certain prophylactic medications (e.g. tricyclic antidepressants, propranolol). Also, children with asthma who take beta blocker medications may need a dose adjustment if taking “triptan” medications.

Keep in mind that the effect and interactions of some herbal and homeopathic medications are currently unknown.

Non-medication techniques for managing pain such as biofeedback, yoga, acupuncture may be quite effective for some patients and should be noted.
Medical Update – Action Plan

• Obtain report of test results, if possible
• Consult with provider re:
  – Medication side effects, interactions
  – Analgesic overuse
  – Status of co-morbidities, concurrent illnesses
• Discuss with family
  – Triggers, diary, efficacy of headache management
  – Provide support, education
Sleep patterns should be considered, specifically snoring, sleep patterns, hours of sleep.

Ongoing assessment regarding behavior at home and at school should occur. It is helpful to identify triggers that precipitate the behavior. In some cases the associated disorder (ADD/ADHD) itself is related to the tic disorder. Additionally, medication used to treat the disorder may affect tics.

Eliciting age appropriate information about speech and language abilities, social interaction, emotional attachment, eye contact, and peer relationships are key to a thorough evaluation. Additional information regarding imitative play, motor mannerisms such as stereotypies, self stimulatory behaviors, lining up objects, and other unusual sounds or noises can also be helpful.
Sleep, food, and water intake are key factors in headache management.

General Health and Psychosocial – Action Plan

- Review importance of:
  - Regular sleep
  - Regular eating patterns
    - No skipping meals
    - Eat breakfast
  - Drinking water
    - Stay well hydrated
    - Carry a water bottle at all times
Children and adolescents will often present with headaches as a result of a change in family structure. This can be death or divorce, or a sibling leaving for the military or college. Financial concerns and insurance coverage can be added stressors for the family of a child or teen with headaches.

Additionally, school issues are a frequent etiology of headaches in adolescents. The spectrum of these issues can range from a teen who is failing school and has excessive absences due to headache, to an “overprogrammed” busy teen who is under pressure to excel in all areas.

Social workers, school counselors, and psychiatric services referrals can be of great value when working with families.

Assessing knowledge, level of concern or worry, and the parent/child perception of the headache and treatment are critical aspects of care.

Information and education are vital regarding the nature of headache, typical progress, and management strategies.
<table>
<thead>
<tr>
<th>Family Dynamics and Coping – Action Plan</th>
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<tr>
<td>• Discuss nature and etiology of headache with family</td>
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<tr>
<td>• Provide information on nutritional, financial, insurance assistance as indicated</td>
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<tr>
<td>• Refer to school counselor if available</td>
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<tr>
<td>• Encourage use of community resources</td>
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<tr>
<td>• Discuss health psychosocial or family issues affecting child with PCP and or child neurology provider</td>
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The first several days to weeks after initiating changes and reducing use of abortive therapy are generally the most difficult. Prophylactic medications can be of great help during this period.

In children with headaches, exercise serves as a daily diversion. It also improves general health and well being and can assist with weight loss and a healthy lifestyle. With younger children, parents will often manage the exercise program and participate in joint activities. In older children and teens, motivational responsibility must come from within. Daily exercise should be presented to children as a headache-free zone, assisting with self-regulation of pain.
School Nurse Involvement

• **Education**
  – Headache diary, role of triggers
  – Parent education and reassurance
  – Reinforce benign nature of headaches

• **Implementation of Management Plan**
  – Close e-mail or phone contact with patient/families
  – Determine efficacy of treatments
  – Assess for side effects

• **Communication with PCP, child neurology provider**
School Nurse Involvement

- Reassurance of child and family
  - No serious medical neurologic disease is present
  - They will be headache free
    - Children’s illustrations of headaches showed depressive features of helplessness, frustration, and anger (Lewis, Middlebrook. et.al., 1996)
Many children with headache have poor school attendance. Ongoing assessment should include grades, ability to focus, learning disability, behavioral or social issues, specialized services or therapies. A current school headache management plan should be in place and revised as needed. Sometimes a thorough educational or neuropsychologic testing plan may be needed to identify learning disabilities, level of function or other subtle factors. Medical home schooling or home-hospital schooling should be used only as a last resort for children and adolescents with headaches. The goal is to “habilitate” them back to their former level of activity and normalize their lifestyle.
School and Therapy – Action Plan

- Obtain/verify exchange of information consent is present and up to date
- Initiate IEP/504 or other plan as appropriate
- Keep teachers and other school personnel informed of student status
- Work with truancy office as needed
- Develop or update school headache management plan
School and Therapy Programs

Larsson, Carlsson et al. (2004)

- Studied effectiveness and efficiency of relaxation training provided at school.
- School nurse administered procedures found to be most efficient form of relaxation.
- Total headache activity, number of headache days, peak headache intensity, medication use were reduced with treatment.
- Treatment gains maintained at 6-10 month follow-up.
School and Therapy Programs

(continued)

- School nurses first line of treatment
  - Time for this intervention may be a challenge
  - Education and training for nurses
  - Easily accessible cognitive-behavioral procedures likely to be effective
  - Internet-based intervention approach found to be effective in reducing headaches and abdominal pain in children age 9 years and older.
School and Therapy Programs

• School reentry plan may be needed for adolescent with long term chronic non-progressive headaches.
  – Encourage brief rest periods at school if headaches occur in class

• Close contact with parents, PCP, providers
  – Empower children and teens that they can actively help their headaches, rather than feeling victimized
  – Chronic illness spectrum—there is no cure
  – Acceptance vs. resignation
School Headache Plan
Provider Resources

American Council for Headache Education
www.achenet.org

National Headache Foundation
www.headaches.org

National Institute of Neurologic Disorders and Stroke
www.ninds.nih.gov

www.ninds.nih.gov/health_and_medical_disorders/headache.htm