Nurses Responding to Patient Symptoms: Improving Outcome Trajectory for Headache Patients

IV-DHE

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Boston Children’s Hospital
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Faculty Disclosure
To identify problems and solutions that improve outcomes and patient safety from IV DHE administration in pediatric headache patients

Objective
Chronic Pediatric Headache is a disabling disorder that, at times, may require inpatient care (Marmura et al., 2015).

Migraine is a common disabling primary headache disorder.

Epidemiological studies have documented migraine as the third most prevalent disorder and seventh-highest specific cause of disability worldwide (Steiner, Stovner, & Birbeck, 2013).

Migraine Headache
A migraine can cause severe throbbing pain or a pulsing sensation, either on one side of the head or bilaterally. It’s often accompanied by nausea, vomiting, photophobia, photophobia, and osmophobia.

Pain can last for several hours to several days.

Warning symptoms known as aura may occur before or with the headache. These can include flashes of light, blind spots, or tingling on one side of the face or in the arm(s) or leg(s).

(Pediatric Migraine: Carod-Artal, Irimia, & Ezpeleta, 2012)
Overview of Pediatric Headache Program

Chronic headache patients

Typical evaluation:

- Neurology, Psychology, Nursing
- Ongoing Research Measures/Metrics Tracked

Follow-up:

- Initial 1 or 2-3 months with adherence evaluation
- Q 6 months to 1 year ongoing follow-up care

Multidisciplinary Chronic Headache Clinic
Top Headache Diagnoses Seen at PHP (%)

- Migraine: 28.6%
- Tension-Type: 19.9%
- Combined Migraine & TTH: 19.8%
- New Daily Persistent Headache: 22.9%
- Other: 8.8%

Pediatric Headache Program (PHP) at Boston Children’s Hospital:

- 226 full evaluations of patients (2015-2016)
- 1,120 return MD visits
- 367 return psychology visits

Chronic Migraine at PHP
**Neurology:**
- Pharmacology: oral medications, including oral triptans
- Physical Therapy
- Diet, Hydration, and Exercise
- Specialty referrals: Neurosurgery – Opthomolgy - Endocrinology

**Psychology:**
- CBT, biofeedback, stress management, pain coping
- Individual and/or family therapy
- 504 plan for school

**Nursing:**
- Life style, family function, school guidance
- Sleep hygiene
- Alternative therapies

**Typical Recommendations for Pediatric Migraine**
Cardiovascular Issues
- MI, PVD, HTN

Medical Co-Morbidities
- Renal or hepatic disease
- Hemiplegic or basilar migraine
- Pregnancy or lactation
- Sepsis or stroke

Medications
- Side effects/interactions: vasoconstrictors, SSRI’s SNRI, TCA’s
  - Antipsychotics may cause Serotonin syndrome
  - Hypersensitivity to ergot alkaloid substances
    - Ergot substances use in past 24hrs

IV-DHE Contraindications
**Consent Form**

**Boston Children's Hospital**

**PROCEDURE CONSENT (EXTENDED) INTRAVENOUS DICYCLOFENACINE (IVDHE) Page 1 of 1**

<table>
<thead>
<tr>
<th>The procedure/treatment recommended to treat or provide a diagnosis of me or my child is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] Intravenous Dicyclofenacine (IVDHE)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The procedure/treatment will be done or supervised by [clinician name(s)]:</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The reasons for the procedure/treatment that have been discussed with me are:</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] intractable headache</td>
</tr>
<tr>
<td>[ ] acute intractable migraine headache</td>
</tr>
<tr>
<td>[ ] new daily persistent headache</td>
</tr>
<tr>
<td>[ ] migraine headache</td>
</tr>
<tr>
<td>[ ] tension type headaches</td>
</tr>
<tr>
<td>[ ] persisting head pain greater than 24 hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The benefits of the procedure/treatment that have been discussed with me are:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Break cycle of headache pain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The risks of the procedure/treatment that have been discussed with me are:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side effects are transient and treated symptomatically they include: increased pain after first dose, followed by improvement with subsequent dosing, nausea (expected and treated with anti-nausea medications through treatment), leg cramping, limb pain, chest discomfort, tingling in the limbs, abdominal cramps, diarrhea, pain at IV site.</td>
</tr>
<tr>
<td>More severe side effects such as hallucinations, severe hypertension and decreased blood flow to the hand and feet, are rare, especially with the pediatric dosing of DHE used.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternatives (other options) to this procedure that have been discussed with me (and their risks and benefits) are:</th>
</tr>
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<tbody>
<tr>
<td>[ ] oral medications</td>
</tr>
</tbody>
</table>

**IV DHE Treatment**
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-9am</td>
<td>Rise and shine, breakfast, get ready for the day. MD/RN/NP visit</td>
</tr>
<tr>
<td>9-10am</td>
<td>Homework time – no TV or screens</td>
</tr>
<tr>
<td>10-11am</td>
<td>DHE infusion, pre/post-VS</td>
</tr>
<tr>
<td>11-12n</td>
<td>Alternative therapies, lifestyle education, get up and move</td>
</tr>
<tr>
<td>12n-1pm</td>
<td>Lunch</td>
</tr>
<tr>
<td>1-2pm</td>
<td>Work with Child Life – crafts, distraction</td>
</tr>
<tr>
<td>2-4pm</td>
<td>Homework time – no TV or screens MD/RN/NP visit</td>
</tr>
<tr>
<td>5-6pm</td>
<td>Dinner</td>
</tr>
<tr>
<td>6-7pm</td>
<td>DHE infusion, pre/post-VS</td>
</tr>
<tr>
<td>7pm-9pm</td>
<td>Relaxation, TV and screens OK</td>
</tr>
<tr>
<td>9pm</td>
<td>Get ready for bed, bathe, TV screens off</td>
</tr>
<tr>
<td>10pm</td>
<td>In bed/lights out</td>
</tr>
<tr>
<td>2am</td>
<td>DHE infusion, pre/post-VS</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>Raskin Protocol</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>6-9</td>
<td>0.1 mg (Q6hr)</td>
</tr>
<tr>
<td>9-12</td>
<td>0.15 mg (Q6hr)</td>
</tr>
<tr>
<td>12-16</td>
<td>0.2 mg (Q6hr)</td>
</tr>
</tbody>
</table>

**Dihydroergotamine (DHE) Dosing**

**IV DHE Dose Revisions**
**Potential Side Effects of DHE**

- Nausea, vomiting – most common
- Chest tightness
- Hives
- Flushed face
- Increased BP
- IV site discomfort
- Limb cramping and pain
- Abdominal cramps, diarrhea
- Ergotism – Hallucinations, HTN

**Actual Symptoms Reported**

- Nausea and Vomiting
- Chest tightness
- Facial flushing
- Tingling chest, arms
- Hot flashes
- Itchiness
- Neck and jaw tightness/pain
- Increased headache pain
- IV site pain
- Fatigue
- Decreased appetite
- Increased anxiety
- Worry about impending dose
- No change in pain rating
**DHE Effects:**
- Effects on 5-HT 1D (Serotonin receptors) located on intracranial blood vessels
- Leads to: vasoconstriction
- Trigeminal inhibition of pro-inflammatory neuropeptide release
- Activation of 5-HT 1D receptors on sensory nerve endings of the trigeminal system result in inhibition of pro-inflammatory neuropeptides

**Pharmacokinetics:**
- 93% plasma bound
- Hepatic clearance
- Bile and feces excretion
- Half life ~ 9 hours

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**Adapted from Goadsby PJ, Olesen J; Diagnosis and Management of Migraine. Br Med J 1996; 312:1279-1283**
Factors in Patient Response

- Pre-admission perceptions
- Parental response
- Fear of pain
- Anxiety
- Depression
- Functional ability
- Staff response
- Extreme Measures
- Interruption in School
- Public Perception
  - Teachers / peers / family
- Hospitalization length of stay (overnight)
- Delivery system - IV
- Pharmacology - rare use
- MD, RN Staff

Placebo Effects
14 yr. female in ninth grade at private school, bright student
H/o obstructive hydrocephalus due to aqueductal stenosis and multiple congenital arachnoid cysts
Initial bilateral VPS at age 4yrs due to HA, ataxia, and nausea
Had 3rd ventricular, retroinfundibular, and post fossa cysts (fenestrated)
Concussions: 3 in 2013; 2 in 2014; 1 in 2015 (falls and sailboat boom)
Headaches with and without shunt malfunction since 2012
Trials of nortriptyliine, topiramate, propranololol, HA supplements, and now zonisamide.
Symptomatic trials of steroids, NSAIDs, hydroxyzine-admitted for IV DHE
Hx of Anxiety and depression, Parents physicians, Maternal Anxiety

Case Study: IV DHE Patient
Incidence of Chronic Headache in Children with Shunted Hydrocephalus:

- General Population: 4% migraine; 6.8% headache
- Hydrocephalus: 21.5% migraine; 15.4% headache
  (Stellman-Ward et al., 1997)

DHE and Intracranial Pressure:

- Altered cerebral auto-regulation
  - Increase in MABP and CPP
  - Increase ICP
  - No change in CBF, arteriojugular venous oxygen difference, cerebral metabolic rate
  (Bundgaard et al., 2001)
Cushing Reflex

- A hypothalamic response to brain ischemia where the sympathetic nervous system is activated which causes increased peripheral vascular resistance with a subsequent increase in BP.
- The increased BP then activates the parasympathetic nervous system via carotid artery baroreceptors, resulting in vagal-induced bradycardia.
- The brain ischemia that leads to Cushing’s reflex is usually due to the poor perfusion that results from increased ICP due to head bleeds or mass lesions.
- Cushing’s reflex leads to the clinical manifestation of Cushing’s triad.
- Cushing’s triad = hypertension, bradycardia, and irregular respirations (Cheyne-Stokes breathing)+/-widened pulse pressure.
Case Study: Clinical Course

- IV DHE dose #2: map ^75, HR 40
- Tx: fluids and lorazepam
- Urgent MRI planned and consulted neurosurgery
- Total # 4 doses completed
- No Improvement in pain level (NRS)
Patient underwent urgent decompression neurosurgery
Post-op course stable
Headache improved acutely
68% of patients were assigned a discharge status of Improved* with 26.3% of all patients completely headache pain-free upon discharge.

Changes in practice as a result of lessons learned have increased overall safety of patients and minimized adverse effects.

IV DHE
Treatment Outcomes at PHP

*N = 37 patients at PHP
*50.8% improvement between initial pain report and pain at discharge
Lessons Learned

- Education for patients and families
- Education for inpatient RN/MD hospital
- Daily activity plan
- Hydration
- Ongoing clinical inquiry and assessment
- Modification to IV-DHE order set improved patient outcomes

Moving

- IV access – Administration
- Psycho-pharmacology
- Psychological Support
- Contemplative Care
- Alternative therapies (Reiki, guided imagery, essential oils, acupuncture)

Forward

Lessons Learned
Full evaluation with Neurology and Psychology prior to admission

Education for inpatient staff: DHE, treatment of chronic disease, psychological factors, rehabilitative approach

Intake screening triage: for SI, self-harm & harm to others, behavioral problems

Education guide created for IV-DHE staff and patients

2 PIV placed at admission

Labs drawn with IV placement

Modifications in Practice: Changes Implemented
- Jtip protocol routine - emla
- Pre bolus - IV D51/2 NS routine 250-500 cc’s
- Dilution of DHE in 10-20 cc/fluid and slow IV push-15mn.
- Increase DHE Doses
- Test dose completed sooner ~30mnt after 1st TD
- Treatment start prior to lab results in healthy patients
- Routine Valium and Ativan dose for anxious patient

Modifications, continued
Future Treatment Considerations

- IV lidocaine
- IV propafol
- Botox
Thoughts?

Comments?

Discussion
REFERENCES:


PHOTOS:

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THANK YOU!
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Boston Children's Hospital
Pediatric Headache Program