CASE REPORT:
COCKTAIL DOSING IN A PREMATURE INFANT WITH A HISTORY OF CHOLESTASIS, SEIZURES, AND APNEA

Shannon W. Fields, BA, CPhT
Innovative Pharmacy Solutions
Edmond, Oklahoma

A pediatrician contacted our compounding pharmacy regarding a 4-month-old infant boy who was in his care. The physician asked for the pharmacist’s assistance in solving a dosing problem for his young patient, who was in need of multiple maintenance medications to treat lingering conditions associated with prematurity. Initially, the physician’s main objectives were treatment of cholestasis, prevention of seizures and apnea, reduction of edema, and supplementation of potassium and sodium chloride.

The patient was being released from the neonatal intensive care unit of a local hospital, where he had been a patient since his premature delivery at 27 weeks’ gestation. The physician felt it was especially important to find an easy, convenient dosing schedule and route of delivery, as the patient’s mother was a young, single, working parent. The mother had admitted she was apprehensive about caring for her baby at home and keeping up with the infant’s required medications. She also expressed the importance of having medications that were easy to dose since caregivers would be staying with her child and administering the medications while she was working. The doctor also wanted a dosage form that would allow for frequent adjustments as the baby grew.

The infant’s initial prescription included the following, all indicated for twice-daily use:
- Phenobarbital - 5.5 mg
- Chlorothiazide - 14 mg
- Potassium phosphate - 137 mg
- Sodium chloride - 58 mg
- Ursodiol - 40 mg
- Theophylline - 7 mg
- Silica gel and Mannitol

After consulting with the physician and the patient’s mother, the pharmacist recommended that these medications be combined into a single capsule which could be opened and combined with formula in a bottle or pacifier dispenser. After a bit of experimentation, the pharmacist settled on mannitol as the sweetener/filler for the capsule, which some studies have shown can help prevent urinary tract infections.

The first month’s dosing was uneventful for both the patient and mother. When the mother called in a refill, however, she requested that the preparation be made to taste differently as the baby had begun to resist taking the medication. The pharmacist consulted the physician, and it was decided to keep the mannitol capsule dosage form but to provide the mother with an orange-flavored sorbitol solution to be added to the mixture in the event of resistance. The mother used the orange-flavored sorbitol solution only occasionally, usually when the baby was fussy.

The physician discontinued the phenobarbital after one month, and the theophylline was discontinued after four months. Dosages were adjusted according to the infant’s growth, and he was closely monitored by his pediatrician. The patient remained on the single-capsule cocktail for nine months, at which point all medications were discontinued.

Suggested Reading


CASE REPORT:
TREATMENT OF LABIAL ADHESIONS IN A CHILD

Shannon W. Fields, BA, CPhT
Innovative Pharmacy Solutions
Edmond, Oklahoma

A 6-month-old girl presented to her pediatrician for a routine well-child examination. The child was by all accounts normal and healthy, and in the normal ranges of length and weight. Although the girl’s parents did not have any pressing concerns about her health, her mother mentioned that on a few occasions when changing the child’s diaper, she noticed the child had vaginal inflammation. Upon further examination, her physician diagnosed labial adhesions.
Adhesions of the labia is a common disorder, affecting 1% to 2% of girls aged 3 months to 6 years. In most cases, a thin membrane covers the vaginal opening between the labia minora. In severe cases, the vaginal opening is entirely closed. Typical treatment includes application of a topical synthetic estrogren cream. This treatment was of concern to the patient's mother, who worked in the pharmaceutical industry and was familiar with recent findings on synthetic hormones and the aborted Women's Health Initiative Trial. With her knowledge of these studies, the child's mother had reservations about using synthetic estrogren on her infant. The pediatrician contacted our compounding pharmacy for advice about possible alternative therapies.

The pharmacy had a hormone specialist on staff, who recommended a topical bi-estrogen (estradiol and estradiol) formulation prepared in an almond oil base to promote elasticity and accelerated healing. The specialist recommended that the estrogen formulation be compounded in a strength of 0.625 mg/mL in a 80% estradiol/20% estradiol ratio, to be applied twice daily until the membrane over the vaginal opening separated. To prevent recurrence follow-up separation of the membrane, daily application of a topical estrogen, the usual treatment protocol, was recommended.

The pediatrician agreed to a trial of the bi-estrogen solution and requested that the parents follow up by phone in approximately 4 weeks. During this 4-week treatment, the membrane over the vaginal opening separated and the inflammation disappeared. Following the 4-week treatment, a topical antibiotic ointment was used for several weeks, as recommended. The patient experienced a recurrence of vaginal inflammation approximately 4 months later, bi-estrogen therapy was resumed and the problem again resolved.

The patient's pediatrician was pleased with the outcome of this therapy and now routinely prescribes bi-estrogen solutions for his patients with labial adhesions.

PRINCIPLES OF PEDIATRIC PALLIATIVE CARE AND PAIN CONTROL

Alexander Peralta, Jr., BS Pharm, MD

Palliatize Medicine Consulting Services

Duncanville, Texas

ABSTRACT

One of the most difficult challenges in health care today is weighing the burdens and benefits of medical treatment. This is especially true in the administration of extraordinary treatments to children with cancer and other life-limiting illnesses. Cancer is the second-leading cause of death in children, and cancer and its treatment are associated with chronic fatal diseases in children. By using their compounding expertise, pharmacists can prepare elegant extemporaneous medications using aqueous techniques. The compounding pharmacist is a valuable member of the interdisciplinary team in hospice and palliative care. The compounding of medications such as nonsteroidal anti-inflammatory drugs, opioids, anxiolytics, and sedatives in specific doses and routes of administration plays a pivotal role in managing symptoms associated with chronic fatal diseases in children. Pharmacists must manage patients in pain and nonpain symptoms may be managed adequately by these specialists.

Barriers to pain control in children include the following:

- Lack of knowledge about the nature of children's perception of pain and illness, such that individuals who treat childhood cancer fail to evaluate all the factors that contribute to pain and thus fail to treat it adequately
- Lack of information about the simple behavioral, cognitive, and supportive techniques that can reduce pain, which may prevent health professionals from teaching these valuable techniques to children and/or their families
- Fear of addiction
- Failure to use WHO-IASP Guidelines

PRINCIPLES OF PEDIATRIC PAIN MANAGEMENT

Pain is one of the most common symptoms experienced by all children and adolescents with life-altering illness. Yet pain in these little people is often discounted or not treated for many reasons; the most common reasons are that pain medications have serious adverse effects or may mask symptoms that are helpful to make an accurate diagnosis, or simply a lack of knowledge in pain management. There is evidence that the developing human has considerable maturability of peripheral, spinal, and supraspinal analgesic pathways in children in contrast to the adult. These nociceptors respond to pain due to tissue injury with specific behavioral, autonomic, hormonal, and metabolic signs, and with symptoms of stress and distress.

Table 1 lists some common types of pain associated with cancer progression, including skeletal or metastatic spread, investigational or standard treatment protocols, invasive and noninvasive procedures, and incidental causes. These types of pain also may be experienced by children with noncancer illness (e.g., organ transplantation, cystic fibrosis, mitochondrial cytopathologic conditions [leukodystrophies], congenital anomalies, sickle cell disease, end-stage organ diseases). Pediatric neuropharmacology is a rapid expanding field that is helping pediatric professionals understand the etiology of pain in children with chronic, fatal diseases.

Pediatric pain management has been a major focus in health care for many years, and many well-respected authorities are promoting aggressive pain control for children in all age groups. However, achieving the goal of providing adequate pain management for children has been a slow and sometimes contentious process. Concerns over addiction, adverse reactions (e.g., respiratory failure, opioid neurotoxicity), and the children’s fear of undergoing painful procedures have caused pharmacists to develop and market the appropriate medications to children. Pain care is a corner stone of today’s advanced technology.

COMMON BARRIERS TO PAIN CONTROL IN CHILDREN

Pediatric healthcare providers have a moral and ethical responsibility to assure adequate pain management for children, regardless of age. We are no longer allowed to say that there is nothing more that can be done when a child has a life-limiting illness. The principle of “double effect” helps healthcare providers understand that our intent is to relieve pain and not to cause harm to our patients. Hospice and palliative care should be offered to children so that their pain and nonpain symptoms may be managed adequately by these specialists.

Roles of the compounding pharmacist

The compounding pharmacist is a very valuable member of the interdisciplinary team in hospice and palliative care. The compounding of medications such as nonsteroidal anti-inflammatory drugs, opioids, anxiolytics, and sedatives in specific doses and routes of administration plays a pivotal role in managing symptoms associated with chronic fatal diseases in children. By using their compounding expertise, pharmacists can prepare elegant extemporaneous medications using aqueous techniques. These compounded pharmaceuticals provide personalized and customized therapies that are not commercially available. Preparations of oral drops, suppositories, and parenteral and inhaled dosage forms for specific pain syndromes are a few examples of how compounding pharmacists assist in the care of children with chronic fatal conditions.

Table 1. Common Types of Pain in Childhood Cancer.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Anticancer Treatments</th>
<th>Procedures</th>
<th>Incidental</th>
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<tbody>
<tr>
<td>Tumor in bone</td>
<td>Postoperative pain</td>
<td>Finger prick</td>
<td>Trauma</td>
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<td>Tumor in soft tissues</td>
<td>Radiation dermatitis</td>
<td>Venipuncture</td>
<td>Usual childhood pain</td>
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<td>Tumor in visera</td>
<td>Gastritis from vomiting</td>
<td>Injection</td>
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<td>Tumor in central or peripheral nervous system (includes spinal cord compression)</td>
<td>Lumbar puncture headache</td>
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<td></td>
<td>Neurologic pain: phantom and stump induced</td>
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<td></td>
<td>Infection</td>
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<td>Mucousitis and mucosal damage</td>
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<td></td>
<td>Osteoporosis from steroid</td>
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<td></td>
<td>Bone marrow or stem cell transplantation and complications</td>
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