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NEW!
Moving Across the Continuum, p. 8

"Brushing the Lungs"

Vest Curbs Pneumonia in Pediatric LTC

BY GRETCHEN HENKEL

High frequency chest wall oscillation (HFCWO) can substantially reduce pneumonia and resulting hospitalizations in medically fragile children in long-term care, according to two recent studies by medical directors. HFCWO is an airway clearance system consisting of a lightweight vest with air pockets that expand to deliver compressions to the lungs. Vest therapy (VT) can be used in place of standard manual chest physical therapy (mCPT), which is performed by "thumping" the patient's chest wall with a cupped hand to promote clearance of lung secretions.

Already proven efficacious in treating patients with cystic fibrosis who also require daily mCPT, HFCWO now appears equally advantageous in children with advanced cerebral palsy and other neurological disorders. "Vest therapy is massively better than manual CPT," said Andy V. Plioplys, MD, CMD, of Chicago, whose study of vest therapy in seven patients was published recently in the *Journal of the American Medical Directors Association (2002;3:318-321)*. In the study, the total number of pneumonias decreased from 36 per year before VT to 18 in the year when VT was added. "The improvements have continued," Dr. Plioplys affirmed in an interview. "We are using the vest in more kids, at more facilities with which I'm involved, and we are seeing similar results [to those in the study]."

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Dr. Chris Landon, Director of the Pediatric Diagnostic Center in Ventura, CA, with his patient, Justin.

Vest Therapy
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Less Pneumonia

Children with severe neurologic deficits are prone to frequent lung infection because they cannot clear secretions from their airways. Adding to the problem is the danger of aspiration from food taken by mouth, or reflux of nutrition delivered

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via gastrostomy tubes. "I view vest therapy as prophylaxis," said Chris Landon, MD, Director of the Pediatric Diagnostic Center in Ventura, CA. "We all brush our teeth to rid the mouth of bacteria. I look at this as 'brushing the lungs.'"

First presented in poster format at AMDA's annual symposium last year, Dr. Plioplys' study of vest therapy tracked clinical data on seven patients with quadriplegic cerebral palsy who resided in two separate skilled nursing facilities: Little Angels in Elgin, IL, and Marklund, in Bloomingdale. All of the patients, aged 7 to 28 years, were wheelchair-bound, fed via gastrostomy tubes, and had frequent pulmonary infections. Dr. Plioplys and his colleagues Sally Lewis and Irene Kasnicka collected data on the patients for 12 months before starting VT and during 12 months of therapy.

At Marklund, the patients received mCPT and postural drainage three times a day before and after receiving VT. At Little Angels, VT was the primary therapy and mCPT and postural drainage were only administered on an as-needed basis. Patients received either one 20-minute VT session or two 10-minute sessions, with additional treatments every 8 hours if needed. The pulse pressure on the vest was between 3 and 5 cm H_20 and the frequency of oscillation was between 13 and 15 Hz, depending on the patient's tolerance.

For the three patients at Marklund the aggregate number of pneumonias decreased from 23 to 11 and the number of hospitalizations for pneumonia decreased from five to one. At Little Angels, pneumonias decreased from 13 to seven, and hospitalizations due to pneumonia were cut in half (from four to two). Use of VT also increased the frequency of effective suctioning of pulmonary secretions.

Since he is both a neurologist and pediatrician, Dr. Plioplys was interested in tracking his patients' frequency of seizures before and during VT. In the three study patients with epilepsy, there was a "substantial reduction in seizure frequency." One patient went from four seizures a month to one; another from nine a month to two; and the third from nine a month to one. Asked why he thought seizures were also reduced, Dr. Plioplys responded, "It's a well-known phenomenon that children who have epilepsy will have seizures when they're sick and running a fever. I think it's very simple [why seizures were reduced]: we just made them healthier."

Similar Results

Dr. Landon's study, also presented in poster format at AMDA's 2002 meeting, showed remarkably similar results with use of VT. Along with his colleagues, neurologist William Goldie, MD, and Jerome Evans, PhD, Dr. Landon did a retrospective chart review of the frequency of pneumonia and hospitalization in 15 medically fragile children. The prospective analysis tracked pneumonias and hospitalizations in the same children while they were receiving HFCWO therapy. Eleven had mental retardation with cerebral palsy; two had spinal muscular atrophy; one had muscular dystrophy; and one had neonatal anoxia. Total hospital days for this group of patients pre-vest therapy was 66. Switching from manual CPT to the vests for airway clearance reduced the number of hospital days to 21. Days in the intensive care unit (ICU) due to pneumonias went from 34 pre-vest therapy to zero afterwards.

Other Advantages

In addition to the primary endpoints of pneumonia and hospitalization, Dr. Landon's study also assessed caregiver satisfaction with VT via periodic surveys. During HFCWO, he found, patients were less combative during therapy; caregivers found the vest easy to understand and use, and noted that patients were comforted and soothed by therapy. The latter effect, although not as quantifiable as reduced hospital days, is a major one, said Dr. Landon in an interview. Lung infections in these patients can be "a very disturbing experience," he observed. Patients may experience a sensation of drowning due to excess mucus in their lungs, and become totally focused on each breath. "Reducing lung infections frees these children up to focus on other things," such as interacting with their caregivers.

Andy Plioplys, MD, CMD

The initial investment in vest therapy is considerable: each vest system costs from $12,000 to $15,000. But, as these two data sets demonstrate, avoiding expensive days in the hospital (approximately $3,100 a day for the ICU in California) can quickly produce a return on investment. In Dr. Plioplys' study, "the administration was happy that they saved on nursing time and the nurses were happy that they did not have to do manual CPT," he concluded.

"Reducing lung infections frees these children up to focus on other things, such as interacting with their caregivers."

Of the 15 children Dr. Landon had originally studied in 1999, two have since died. Ongoing treatment with vest therapy eased end-of-life care for these patients, he believes. "When their neurologic deterioration reached a certain point, and their parents were ready to accept that their lives had come to an end, we stopped the vest treatment, and they passed on much more quickly than they would have with standard mCPT," said Dr. Landon. ■