



# Clinical Update

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## DEHP-Free: Important for You and Your Patients

Polyvinyl chloride (PVC) is a common plastic used in healthcare. In the sixties, it revolutionized healthcare by replacing glass and rubber that had to be sterilized with single-use, disposable products. Some manufacturers add phthalates, which makes the PVC more soft and flexible. In recent years, concerns have been raised about the safety of long-term repeated exposure to these substances.

### About DEHP

Di-(2-ethylhexyl) phthalate (DEHP) is the plasticizer most commonly used in medical-grade PVC. It may be found in IV bags and tubing, intravascular catheters, blood bags, nasogastric tubes, tracheotomy tubes, ECMO tubing, and tubing used for hemo- and peritoneal dialysis.<sup>1, 2</sup> We are exposed to DEHP in everyday life through consumer products including food and food packaging, toys, floor tiles and furniture upholstery.<sup>3</sup> Phthalates are common components of household dust.<sup>3</sup> In fact, it is so common that most children's urine samples and human breast milk contain measurable amounts of phthalate metabolites.<sup>3</sup> In healthcare, DEHP leaches from plastic bags and tubing into fluid being administered, whether intravascular or enteral through tube feedings.<sup>4</sup> Most people have no adverse effects. However, studies in laboratory animals have raised questions about possible effects of DEHP on development of the male reproductive system and on sperm production.<sup>1</sup> There are no confirming studies on humans, but high-risk exposures have been identified.<sup>1, 5</sup>

### DEHP Risk Factors

Two key aspects of risk determination are (1) a patient's sensitivity to DEHP, and (2) the amount of DEHP the patient receives. Based on animal studies, the highest sensitivity appears to be in the male fetus, the male neonate (particularly if premature), and males around the time of puberty.<sup>1</sup> Critically ill, premature male infants are at the highest risk from exposure.<sup>4</sup> Procedures posing the highest risk for DEHP exposure include: ECMO, parenteral nutrition, exchange transfusion, and multiple procedures in neonates; hemodialysis in adolescent males, pregnant or lactating women; enteral nutrition in neonates and adults; and heart transplant, CABG, massive transfusions in trauma, and transfusions during ECMO in adults.<sup>1, 4, 5</sup> Ironically, there may be increased exposure in hospital food resulting from food service workers wearing vinyl (PVC) gloves to replace latex.<sup>3</sup> It appears that DEHP is most likely to leach out of tubing when

it is heated, such as indwelling catheters that warm to body temperature.<sup>3</sup>

Little or no risk occurs during routine crystalloid infusion from PVC IV bags.<sup>3</sup>

Risk can be reduced by using substitute materials for high-risk procedures, such as PVC without DEHP, silicone, polyethylene, or polyurethane.<sup>2</sup> Heparin-coated ECMO circuits will reduce exposure as well.<sup>1</sup> However, since risk in humans is not proven, it is important to assess risk on a case-by-case basis and not endanger immediate patient safety by using an inferior product because of the potential risk of DEHP exposure.<sup>5</sup>

### Reducing DEHP

Government safety organizations in the U.S., Canada and Europe have examined issues relating to DEHP.<sup>1,4-6</sup> Overlapping recommendations and regulations apply to limits on DEHP in drinking water, landfills, workplaces and consumer products. While there are no bans for its use in medical devices and products, there has been a strong push to label products as containing DEHP so organizations can be knowledgeable consumers. A law requiring labelling goes into effect in the European Union in 2011.<sup>7</sup> Organizations should develop plans to limit exposure, particularly in high-risk populations, much as has been done with latex exposure in the past 15 years ([Clinical Update, March 1998](#)). Give priority to products used in care of neonates, infants younger than one year, and pregnant women.<sup>6</sup>

One-third of disposable medical products are made from PVC.<sup>7</sup> The first step is to ask vendors about their labeling and availability of DEHP-free products. Next, conduct an audit to learn about the products containing DEHP in your hospital. Not all products are labeled as such, but if a product does not contain PVC, it will not contain DEHP. Labels on PVC-free products may read EVA, polyurethane, silicone, polypropylene, or TOTM. Latex-free products are often made of PVC, so check for additional labeling of "DEHP-free" or "PVC-free." Reducing the number of PVC products containing DEHP is similar to the process most of us went through to identify latex-containing products in our goal to become "latex-free."

Just as nurses have made their voices heard to reduce latex and mercury in their care environments, nurses can lead the way to improve awareness of issues related to DEHP and to change purchasing practices to seek DEHP-free products.

## In The Literature

### Assess Stroke With These Tools

The January issue of the *Journal of Emergency Nursing* provides a handy collection of stroke scales all in one place for quick reference. It's easy to compare these validated tools and determine which would be best for your practice setting. Included are: Cincinnati Stroke Scale (prehospital), Hunt & Hess Scale (non-traumatic subarachnoid hemorrhage), National Institutes of Health Stroke Scale (the "gold standard" but long, at 15 complex assessments; for more see <http://nihstrokescale.org>), and ABCD<sup>2</sup> (risk of stroke after TIA).

Source: Harding A: Stroke scales you can use. *Journal of Emergency Nursing* 2010;36(1):40-52. [PubMed Citation](#)

### Sepsis Warning Outside ICU

Sepsis is a particular challenge for critical care nurses because most patients have multiple organ failure before sepsis is recognized and patients are transferred. A terrific article in the current issue of *MEDSURG Nursing* describes risk factors, signs and symptoms for SIRS preceding sepsis, and a surveillance tool for the general medical-surgical unit. A primary element in reducing mortality and morbidity is early recognition and treatment with antibiotics and fluids outside the ICU.

Source: Dodge MR: SIRS: A systematic approach for medical-surgical nurses to stop the progression to sepsis. *MEDSURG Nursing* 2010;19(1):11-15. [not yet indexed in PubMed]

### Don't Lose Nursing's Essence

With the growth of evidence-based practice, we are more comfortable with protocols, algorithms, decision trees and the medical model of care. But we need to remember to keep the essence of nursing – the language of nurses – in our plans. These authors describe the use of nursing interventions classifications (NIC), nursing outcomes classifications (NOC) and nursing diagnosis in acute cardiac care to ensure that evidence-based nursing practice is documented, supported and targeted for patient-focused outcomes.

Source: Case R, Haynes D, Holaday B, Parker VG: Evidence-based nursing: the role of the advanced practice registered nurse in the management of heart failure patients in the outpatient setting. *Dimensions of Critical Care Nursing* 2010;29(2):57-62. [PubMed Citation](#)

#### Sources

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3. Sathyanarayana S: Phthalates and children's health. *Current Problems in Pediatric and Adolescent Health Care*. 2008;38:34-49. [PubMed Citation](#)
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5. Scientific Committee on Emerging and Newly-Identified Health Risks: Opinion on the safety of medical devices containing DEHP-plasticized PVC or other plasticizers on neonates and other groups possibly at risk. Brussels: European Commission; 2008.
6. Hall AG: Nurses: taking precautionary action on a pediatric environmental exposure: DEHP. *Pediatric Nursing* 2006;32(1):91-93. [PubMed Citation](#)
7. Hansen OG: Phthalate labelling of medical devices. *Medical Device Technology* 2007;18(6):10-12. [PubMed Citation](#)

## On the World Wide Web



### No Harm

*Healthcare Without Harm* is an international coalition of health care organizations, medical professionals, community groups and others that work to promote health – for people and for the environment. Members work to develop products and practices that do not compromise patient care or safety while also being sustainable and not harmful to public health or the environment. This Web site provides a wealth of free resources on a variety of environmental concerns; be sure to check out the *Guidelines for an Audit* for ways to determine if you are using PVC products containing DEHP.

<http://www.noharm.org/>

### Choose Words Carefully

*When a Superficial Report Leads to a Deep Problem* is a case report from AHRQ Web M&M that should be mandatory reading for all health professionals. It describes a case in which a report of thrombosis in the superficial femoral vein was misinterpreted as meaning no DVT. In the case discussion, the author provides a table of terms that can easily be misunderstood because common medical words used in combination can have different meanings. Making colleagues aware of these terms can help prevent serious errors in care.

<http://webmm.ahrq.gov/case.aspx?caseID=210>

### Check This Out

*Project Check* is a new site from Dr. Atul Gawande to share checklists for safe patient care. Three surgical checklists from the Society of Thoracic Surgeons are included, as well as those on H1N1, daily ICU care, central line placement and others.

<http://www.projectcheck.org>

Be sure to visit **Atrium University**, a free, online resource filled with educational materials about chest drainage. From basic to advanced, the University provides learning opportunities in written, Web-based training and video formats.

