



How to survey PVC use in your hospital and begin a successful PVC phase-out programme

This factsheet explains the following:

- How to do a PVC Audit
- After the audit: Piloting alternatives
- Which PVC products should be replaced first?
- Examples of product labels and what they mean
- List of products used in hospitals which are commonly made from PVC
- Template for recording results of PVC/DEHP audit
- 10 Tips for a successful PVC elimination programme

For additional information or copies visit the Health Care Without Harm website: www.noharm.org/europe

The PVC Audit: Stage One in Phasing Out PVC

Many hospitals are reconsidering their use of PVC (polyvinyl chloride or vinyl) medical products, due to concerns about patient safety and potential environmental health effects. The use of flexible PVC medical devices often exposes patients to the reproductive toxicant DEHP (di-2-ethylhexyl phthalate). PVC manufacture and disposal (especially through incineration) emits dioxins – known human carcinogens which cause reproductive and developmental disorders.

This factsheet describes how to audit and begin phasing out PVC use in your hospital. It also includes information such as a list of products which are often made from PVC, and a guide to interpreting product labels.

An audit is the first step in a PVC phase-out programme, which consists of three steps:

1. Performing an audit to identify PVC and DEHP products
2. Identifying and evaluating alternatives
3. Purchasing PVC- or DEHP-free products of equivalent quality and performance

It is always preferable to try and phase out PVC, rather than just the plasticizer DEHP. We can't be sure that alternatives to DEHP will be any safer. And replacing one plasticizer with another fails to address the environmental problems posed by using PVC.

PVC Audits have been performed by many hospitals in Europe, including Karolinska University Hospital (Sweden), Sonderborg Hospital (Denmark), Olomouc Faculty Hospital (Czech Republic), Kosice Saca hospital (Slovakia) and the Viennese and Styrian Hospital Associations in Austria, among others.

Where possible, all these hospitals have tried to eliminate PVC altogether, rather than just the plasticizer DEHP.

More information on why hospitals are phasing out PVC is available on-line at www.noharm.org, and in our factsheet “Why hospitals are moving away from PVC”.

How to do a PVC Audit

Step 1. Get a list of devices used in your department

Start the audit with purchasing. The purchasing manager will have a list of many devices used in your department. He or she may even know of others who completed a similar audit. Note that your department may be using products not on an ‘official’ purchasing list.

If only we lived in a perfect world...

Performing a PVC audit should be relatively simple. You should be able to:

1. ask your procurement manager for the list of medical devices purchased by your department
2. review each device label to see if it contains DEHP or is manufactured from PVC
3. write up a list of products that contain PVC and DEHP

Unfortunately, when it comes to DEHP and PVC in medical devices, things are not so easy. In most situations purchasing lists are incomplete, the presence of PVC or DEHP is not noted on the product label, and manufacturers are reluctant to provide material content data.

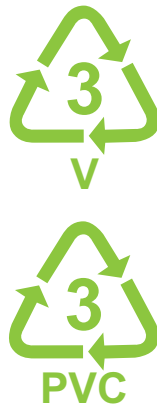


Step 2. Perform a walk through of your department

Review all flexible plastic products on your storage room shelves. Any flexible plastic product, clear or opaque, could be made out of PVC. PVC is especially widely-used in bags and tubing (see the list of common PVC medical devices at the end of this factsheet.)

Carefully read the labels. Each manufacturer labels material content differently. Usually, products are not labelled with material content at all.

- Keywords for PVC-free products include: “EVA”, “Polyurethane (PU)”, “Silicone”, “Polypropylene (PP)”, “PVC-free.”
- Keywords for PVC products made without DEHP include: “DEHP free” and “TOTM” (non-DEHP plasticizer).
- Keywords for products containing DEHP: “Contains DEHP”, “Polyvinyl chloride”, “PVC”, “Vinyl” and the recycling symbol containing the number 3.
- Products labelled as containing PVC, but with no mention of DEHP, usually contain DEHP. Flexible plastic medical devices with no mention of material content could be made from PVC softened with DEHP. (There is a guide to labels at the end of this factsheet.)



Update your purchasing list by adding material content information for those additional products you found on the shelves in your department. Your product list should include the product name, product number, product size and manufacturer name. (There is a template for this at the end of this factsheet.)

Step 3. Find the missing material data

Unfortunately, you will not be able to find out the material content for some of the devices immediately. Hospitals have adopted various strategies for dealing with this problem.

At Karolinska University Hospital (Sweden) it helped a lot when the Environment Department took charge of conducting PVC audits. They worked intensively with purchasing departments in gathering missing information.

The Neonatal Intensive Care Unit at Olomouc Faculty Hospital contacted manufacturers directly. With accurate product information in hand (e.g., product number, product size) and persistence the head nurse extracted material content information from manufacturer representatives. She found that syringes, central venous catheters, ventilation tubing or intravenous cannulae were available in alternative materials such as silicon, polyethylene, polypropylene or rubber.

Purchasing managers or head pharmacists can be of great help. Since they work with manufacturers’ representatives, they know how to get information from them. With growing concerns over DEHP exposure, purchasing and environmental departments are beginning to label products in their catalogues with information on DEHP and PVC content.

Note: It always helps when manufacturers and large purchasing organisations hear directly from their customers. Many manufacturers say they do not label material contents because customers do not request it.

Step 4. Identify alternatives to PVC/DEHP products

Once you have a list of PVC devices, you need to find out which you can phase out. This means finding out which PVC products have PVC-free alternatives.

Look for alternative products and manufacturers. Start with the website of Health Care Without Harm. A list of PVC-free devices on the EU market can be downloaded here: www.noharm.org/europe/pvcDehp/pvcFree

You should also work with your purchasing and environmental departments. Review the list of available products offered through your purchasing department. If you cannot find alternatives, ask your purchasing department to identify or make DEHP-free alternatives available.

Contact medical device manufacturers. Ask for PVC- and DEHP-free products that meet your particular specifications for your particular products (for example, some manufacturers may only offer DEHP-free products in their adult product line). Request that they work with you to make more DEHP-free products available for your specific needs.

“The NICU Head Nurse put together a list of 106 products that could have been made of PVC. We contacted all the manufacturers but many of them did not fulfil their promise to give us the information about the material. However, over time we found more manufacturers willing to take seriously our demands for PVC-free alternatives and started to label the packaging, for example.

“One company then offered to substitute the entire complex of intravenous devices with PVC-free alternatives for a very good price. Olomouc has now succeeded in substituting about 95% of all medical devices that come in direct contact with neonates.”

Miroslava Jopkova, PVC Project Coordinator for Arnika, a HWCH Europe member in the Czech Republic, working with Olomouc Hospital on PVC phase-out.

After the audit: Piloting alternatives

Once you have identified a few non-PVC medical devices that you could use as substitutes for PVC/DEHP products, run a pilot phase of using them in selected departments. It is vital to check that their performance is safe, accurate and cost-effective for the specific medical procedure.

After the pilot phase, evaluate the benefits of using the substitute and if there are positive results, begin purchasing the device for the entire ward or hospital.

Such a pilot project was performed at the Maternity Clinic of the Styrian hospital in Austria. They found alternatives for 8 of the 13 devices identified as containing PVC which all either fulfilled or exceeded the performance requirements. Among the substituted devices were female catheters, adult oxygen masks and infusion sets for pressure or gravity infusion.

Which PVC products should be replaced first?

Since you cannot phase out all PVC immediately, you should select the patient groups and procedure areas where substitution will have the greatest impact.

Karolinska University Hospital (Sweden) prioritised neonatal clinics and the haemodialysis and peritoneal dialysis departments for a PVC audit, as they treat patient groups at particular risk of exposure to DEHP due to the prolonged treatment and age of patients.

The EU Scientific Committee for Emerging and Newly Identified Health Risks (SCENIHR) identifies male infants and the male offspring of pregnant and breastfeeding women as the most at risk from medical procedures resulting in extensive DEHP exposures. (1)

The following procedures cause considerable exposures to patients:

- Multiple procedures in pre-term neonates
- Total Parenteral Nutrition (TPN) in neonates
- Extracorporeal Membrane Oxygenation (ECMO) in neonates
- Exchange transfusion in neonates
- Enteral nutrition in neonates and adults
- Haemodialysis
- Heart transplantation or coronary artery bypass graft surgery
- Massive infusion of blood into trauma patients
- Transfusion in adults undergoing extracorporeal membrane oxygenation ECMO

Examples of product labels and what they mean

Label	What the label means
E.V.A. Mixing Container	The bag is made from ethylene vinyl acetate (EVA). Since EVA is not PVC, it is plasticizer-free. It does not contain DEHP or any other plasticizer
Silicone Feeding Tube	The tubing is made from silicone rubber: no PVC, no DEHP, no plasticizer
Polyurethane Umbilical Vessel Catheter	The tubing is made from polyurethane: no PVC, no DEHP
0.9% Sodium Chloride Injection USP ... Latex-free; PVC-free; DEHP-free	This label is easier to understand. The product does not contain DEHP or PVC, although the label does not specify the material the bag is made from
IV Administration Set ... TOTM (Non-DEHP) PVC Fluid Path	Tube made with PVC, plasticizer is TOTM, an alternative to DEHP
IV Administration Set, Polyethylene Lined Tubing with PVC Cassette	Tube made with PVC, plasticizer not specified, probably DEHP, polyethylene coating added to inner tubing surface to reduce DEHP leaching
Extension Set [for lipids] ... Contains DEHP	PVC softened with DEHP
Oxygen Connecting Tube, Polyvinyl Chloride	Tube made with PVC, type of plasticizer used is not specified. When plasticizer is not specified, it is probably DEHP
Catheter - 9.6 French ... Latex Free	It is not clear what plastic or plasticizer this product contains. Suspect PVC with DEHP, but that can only be verified by contacting the manufacturer

(1) EU Scientific Committee on Emerging and Newly-Identified Health Risks (2007). *Preliminary report on the safety of medical devices containing DEHP-plasticized PVC or other plasticizers on neonates and other groups possibly at risk.* (p.43). Link: http://ec.europa.eu/health/ph_risk/committees/04_scenihr/scenihr_cons_05_en.htm

List of products used in hospitals which are commonly made from PVC

- » **Ambulatory products**
- » **Anaesthesia Products**
 - catheters
 - guedel airways
 - nasal airways
 - face masks
- » **Bedding Products**
- » **Body Bags**
- » **Body Protection Products**
 - aprons
 - overshoes
 - eye protection
- » **Blood Collection/ Infusion Products**
 - blood bags
 - cord blood freezing bags
 - blood filters
 - blood packs
- » **Central Line Catheters and PICC Lines**
 - central venous catheters
 - midline catheters
 - peripherally-inserted central catheters (PICC)
- » **Diabetic Care**
 - Insulin Syringes
 - Insulin Pens
- » **Diagnostic Equipment**
 - sampling kits
- » **Dialysis**
 - haemodialysis catheters
 - peritoneal dialysis sets
- » **Disposable Plastics**
 - plastic packaging, bottles, stoppers
 - pipette tips, cuvettes, inhalers
 - tweezers and forceps
 - disposable bags
 - autoclave disposable bags
 - surgical spears
- » **Dressing Products**
- » **Ear Nose and Throat (ENT) Products**
 - tracheostomy tube holders
 - laryngectomy tubes
 - stoma studs
 - laryngo foam filters
- » **Epidural Vessel Catheters**
- » **Enteral and Total Parenteral Feeding Products**
 - bags and tubing
 - extension sets
 - gastrostomy tubes
 - nasoenteric tubes
 - nasogastric tubes
 - nasojejunal tubes
 - pediatric clear straight catheters
 - PEG tubes
 - accessories – feeding connectors
 - pump administration sets
- » **Gloves**
 - examination
 - surgical
- » **Gastroenterology Products**
 - ostomy bags
 - rectal pressure catheters
 - jejunal feeding tubes
 - abdominal pressure catheters
 - rectal tubes
 - hurst esophageal bougie
- » **Identity Wrist Bands**
- » **Intravenous (IV) Products**
 - administration sets
 - anti-coring needles
 - IV bags and containers
 - IV tubing
 - infusion filters
 - extension sets
 - IV catheters
 - intravenous cannulae
- » **Irrigation/Drainage**
 - drains
 - drainage systems
 - drainage catheter
 - body fluid disposal kits
 - surgical and wound drains
 - free line suction catheters
- » **Laboratory Products**
- » **Patient Care Products**
- » **Radiation Aprons and Shields**
- » **Respiratory/ Oxygen Therapy Products**
 - oxygen tubing
 - nasal tubes
 - endotracheal tubes
 - humidification systems
 - intubation sets
 - laryngectomy tubes
 - oxygen, resuscitation masks
 - oesophageal tubes
 - suction pump tubes
 - resuscitators
 - tracheostomy tubes and cannulae
 - nasopharyngeal airways
- » **Reusable Products**
- » **Syringes**
- » **Total Parenteral Nutrition**
 - bags
 - catheters
 - tubing
- » **Urinary/ Incontinence Products**
 - bladder catheters
 - urinary drainage bags
 - urinary catheters



Template for recording results of PVC/DEHP audit

Product Type	Product Name	Product #	Product size	Manufacturer	Type of Plastic	Does material contain DEHP?	Does the material other softeners?
Blood bags (not including packed red blood cells)							
Central line catheters							
Enteral administration sets							
Enteral feeding bags							
Enteral feeding tubes							
IV administration sets							
IV bags							
IV tubing							
Peripherally inserted central catheters (PICC) lines							
Total parenteral nutrition							
Umbilical vessel catheters							
Urinary drainage catheters							
Wound/drainage systems							

10 Tips for a successful PVC elimination programme

Hospitals can take further measures to reduce the use of PVC in addition to an audit:

1. Create a hospital-wide policy that includes a resolution or pledge to reduce PVC- and DEHP-containing medical products.
2. Perform a system-wide audit to determine the presence of PVC- and DEHP-containing medical products throughout the facility. Make sure to ask the following questions:
 - i. Does the audit include an inventory of all PVC/DEHP-containing products?
 - ii. Have you labelled those devices containing PVC/DEHP?
 - iii. Do you have a plan in place to replace those devices that contain PVC/DEHP?
3. Make someone responsible for conducting PVC audits. If you decide on a system-wide audit, create a committee consisting of key staff who will be affected by the PVC elimination policy (such as purchasing managers, head nurses, head pharmacists, environmental and/or occupational safety managers). This committee should regularly review how much PVC/DEHP is used and/or eliminated to ensure continuous quality improvement.
4. Perform departmental audits to determine the presence of PVC/DEHP-containing medical products throughout the department (e.g., Neonatal Intensive Care Unit, Paediatric, Maternal and Child Health, Paediatric Intensive Care Unit).
5. Replace any products or product lines that contain PVC/DEHP. Prioritise those used to treat the most vulnerable patient populations and those which cause exposure over a long period.
6. Implement a purchasing policy statement that requires the elimination or reduction of PVC/DEHP containing medical products wherever feasible.
7. Require a PVC/DEHP disclosure on all products coming into your facility that could contain PVC/DEHP, through vendor contracts.
8. Request information about PVC/DEHP-free products from your purchasing department or central purchasing institution.
9. Include language in your vendor contracts that specifies your preference for PVC/DEHP-free products.
10. Ask manufacturers to identify products in their catalogues that contain (or do not contain) PVC/DEHP.

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