Avoiding PVC Use in Hospitals

Healthcare patients, especially children, may be at risk from the use of medical devices made of polyvinyl chloride (PVC) plastic, which contain DEHP. Known as a reproductive toxin, DEHP[1] -causes birth defects and infertility in animal studies. Because DEHP does not bind to the PVC matrix, it can leach out of the medical device into the liquid transferred to the patients' body.

Despite the fact that non-PVC medical devices are readily available on the market, many hospitals are still using PVC medical devices that leach DEHP. This brochure aims to showcase how several hospitals and health care facilities across Europe have already taken the necessary steps to eliminate PVC use in medical devices.

Vienna Hospital Association Phase Out Policy on PVC

The Vienna Hospital Association operates 18 hospitals, nursing homes and geriatric care centres, employing 32 000 people in total. In 2002, the Vienna Hospital Association looked after 3.4 million patients in ambulant and 400 000 patients in stationary care annually with a turn over of 2.3 billion Euro. The Vienna Hospital Association's policy to eliminate PVC from packaging, building materials and medical devices dates back to 1992 when Vienna City Council decided to phase out PVC from all city funded projects and institutions.

Two of the Vienna Hospital Association hospitals - Glanzing Paediatric Hospital and Preyer Paediatric Hospital - serve as excellent examples of PVC and phthalate elimination. They have succeeded in becoming almost completely PVC-free. The Neonatology Unit of the Paediatric Clinic Glanzing has thus become the first Neonatology Unit worldwide to eliminate almost entirely the use of PVC and DEHP in medical practice.

The first step was a PVC audit conducted by hospital staff to identify PVC containing products and to quantify the amount of PVC waste generated. Among the PVC containing products were respiratory therapy products, catheters and tubing, urinary drainage catheters, blood pressure seals and ECG electrodes. Approximately half of these PVC products were replaced, and for the remaining ones, alternatives were tested or researched. Measured by weight, the share of PVC products amounted to 14.6% (Glanzing) and 9.8% (Preyer) of the total weight of examined products. The PVC share of the entire medical ward waste was 0.9% in the Preyer Hospital and 0.37% in the Glanzing Hospital.

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At present, three other neonatology clinics of the Vienna Hospital Association (two located in the Vienna General Hospital, one in the Danube Hospital) are also successfully phasing out PVC / DEHP containing devices based on the experiences gathered by the Glanzing Clinic.

By June 2003 the Neonatology Unit of the Paediatric Clinic Glanzing had almost completely phased out PVC/DEHP disposable products. Currently, almost all the invasive medical products, such as catheters and tubing used in the Paediatric Clinic, are PVC-free. Pacifiers, IV bags, blood filters, respiratory therapy equipment, feeding tubes and other tubing used at the Clinic are made from non-PVC materials. PVC is used only for a few non-invasive products, because there are currently no alternatives on the market. However, even with those products, hospital management expects that PVC-free products of the same performance quality will be on the market within one to two years.

In addition to PVC-free medical devices, the Vienna Hospital Association strategy also involves construction work, where PVC alternatives have been found for flooring and window frames since 1990. In the last two years, pilot renovation projects for three hospital pavilions have been initiated in which the use of PVC will be avoided in all sectors, including all electrical installations such as cables and wires.[2]

Stockholm County Council PVC Elimination Policy

Stockholm County Council passed a resolution to phase out PVC in 1997. PVC was identified as a priority to be avoided in the procurement of new products as part of a sustainable purchasing policy. The program prohibits the use of PVC unless a very strong, written explanation for its purchase and use is provided as part of the purchasing process. In many disposable medical products, PVC has been avoided, with a few exceptions such as tubing and blood transfusion bags. For blood transfusion in small children fresh blood is used, i.e. blood that has been kept in the blood bag for only a few days. Alternatives for blood transfusion bags have been tested but due to the fact that DEHP acts as a stabilizer of the red blood cell membrane and thus preserves the blood, DEHP-softened PVC is still in use. Although there are no legal restrictions on the use of DEHP, hospitals try to avoid DEHP-softened tubing for use with small children. For example, at 32 neonatology units in the country, feeding tubes used for the long-term treatment of babies are made of non-PVC materials.

In addition, Karolinska University Hospital has finalised a procurement contract for gloves for the entire complex of Stockholm County Hospitals. PVC gloves softened with phthalates are being gradually substituted for nitrile gloves.

Aarhus County PVC-free database

The Danish Environmental Protection Agency recommends avoiding PVC products wherever safer alternatives are available on the market. The Greena County Hospital began to phase out PVC medical devices in 1988. Over the years, the hospital has succeeded in substituting 90% of PVC products with safer alternatives. They have created a comprehensive database of non-PVC products including medical devices, office supplies and kitchen products. The database is currently managed under the Aarhus county and available for public procurement authorities. It was translated in English and is publicly accessible on the web at http://cold.aaa.dk/pvc/. It provides buyers with information on specific products, material it is made of and manufacturers' contact information in Denmark.

The main reason behind the elimination of PVC use in hospital was not so much the issue of DEHP leaking into liquids

transferred to a patient's body but more the issue of PVC waste. Incinerated PVC waste contributes significantly to dioxin production and the potential for recycling PVC was minimal. The objective of this database was to increase the demand for non-PVC products, which constitute a suitable alternative of same quality and performance as PVC products. Its aim was to assist the public sector buyers to choose PVC-free medical devices. Although not recently updated the database is still available and provides a very detailed overview of products that are available on the market in PVC-free version.

Na Homolce Hospital - Czech Republic

The Czech Hospital Na Homolce has switched to PVC-free IV bags as of November 2003. The initiative came from the renal unit because dialysis patients belong to the group of patients exposed to high levels of DEHP due to long-term medical procedures. Patients on dialysis receive multiple treatments with intravenous liquids; therefore the exposure from these IV bags is significant. The initial costs of PVC-free bags were higher, however the hospital managed to negotiate a fairly competitive price with one of the major IV bags suppliers. After 3 years, the hospital pharmacy - the central purchasing unit - completely switched to PVC-free IV bags and safer alternatives made of multi-layer plastic from polyethylene (PE), polyamide (PA) and polypropylene (PP) are now used in majority of hospitals units. IV Bags represent the group of medical devices that is most easily substituted as they are purchased in large quantities and bags made of safer alternatives are generally price competitive.

Neonatology Intensive Care Unit at the Faculty Hospital in Olomouc

The NICU at the Faculty Hospital in Olomouc began to consider the problem of DEHP exposure to neonates after a seminar organized at the Czech Neonatologists Association jointly with environmental groups HCWH and Arnika. Consequently, the NICU head nurse performed a PVC audit of medical devices and collected information about 106 products used for treating the newborn patients. She asked all manufacturers to provide information on used material, however majority of them did not respond to the request. Out of 81 most commonly used products, the nurse was able to identify the components of 58 through the label information on the packaging or responses from the manufacturers. 33% of those 58 products were made of PVC.

As a result, the NICU at Faculty Hospital Olomouc began to negotiate with one of the leading medical devices manufacturer B Braun who agreed to deliver an entirely PVC-free set for infusion therapy, including the exchange transfusion set. There is a policy in place now to favour non-PVC medical devices if available on the local market. Unfortunately, for several alternative products available on the other EU markets, these are not available in the Czech Republic incl. endotracheal and feeding tubes.

Kaiser Permanente Case Study

Kaiser Permanente is the US largest non-profit health care provider, serving 8.4 million people in the US. Kaiser Permanente operates 29 medical centres, and 423 medical office buildings. There are 129 000 employees and 11 000 physicians. In 2001, after learning of the potential hazards to neonatal patients from DEHP exposure, Kaiser Permanente staff underwent a process to identify DEHP-containing medical devices used in the Neonatal Intensive Care Units. Kaiser Permanente staff conducted an inventory of NICU products. The nurse manager of one Kaiser Permanente neonatal unit gathered products from the unit and asked experts to help identify products that potentially

contained PVC/DEHP, products that were high risk for exposure, and products for which alternatives to PVC/DEHP were readily available that would meet quality and performance criteria.

Based on the results of the trials and evaluations, staff recommended to switch to non-PVC/DEHP products for three commonly used NICU devices: umbilical vessel catheters, PICC lines and enteral feeding products. The fourth product identified for replacement, neonatal endotracheal tubes, was not recommended for a switch because a suitable alternative was not identified. As a follow-up to the process, Kaiser Permanente engaged in a discussion with its supplier, Baxter International Inc., to conduct an analysis of Baxter's products and to focus on other non-DEHP containing Baxter products that could be adapted for NICU use. More details available at www.noharm.org/pvcDehp/reducingPVC

Resources:

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[1] Classification established by Commission Directive 2001/59/EC - 6 August 2001.

[2] Rubin RJ and Schiffer CA, 1976. Fate in Humans of the Plasticiser, di-2-ehthylhexyl phthalate, arising from transfusion of platelets stored in vinyl plastic bags. Transfusion, 16(4): 330-335. See also

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You can find more information about the issue of DEHP/PVC in health care at Health Care Without Harm website: www.noharm.org/pvcDehp.

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