

DEHP: Concerns and Alternatives

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Take Home Message

1. Increasing Medical Concerns -
FDA Advisory: Minimize DEHP products
in high-risk patient populations.
2. Tackle High-Risk Areas & Align Your
Focus and Influence.
3. Alternatives Are Readily Available.
4. \$\$ - Additional Cost Is Relatively Low:
~10-20% more, <\$20/patient/day

The Larger Issue...PVC

- Most widely used plastic in medical products
 - Cost
 - Flexibility
 - Transparency
 - Resistance to breakage
- 27% of all plastic used in 1996
- The only common plastic that is chlorinated
- DEHP (di-ethylhexyl phthalate) often used as a plasticizer in medical devices



DEHP

di (2-ethylhexyl) phthalate

- Migrates from PVC when in contact with fluids, air, or heat

- Lipophilic

Leaching increases with...

- Temperature
- Contact (storage time)
- Amount of fluid
- Agitation
- Lipid content



Increasing Medical Concerns

- Reproductive & developmental toxicant
- Infertility, hypospadias spectrum, premature thelarche
- Targets Sertoli cells of the testes
- Liver and pulmonary effects

❖ FDA and NTP issued warnings



Government Warnings

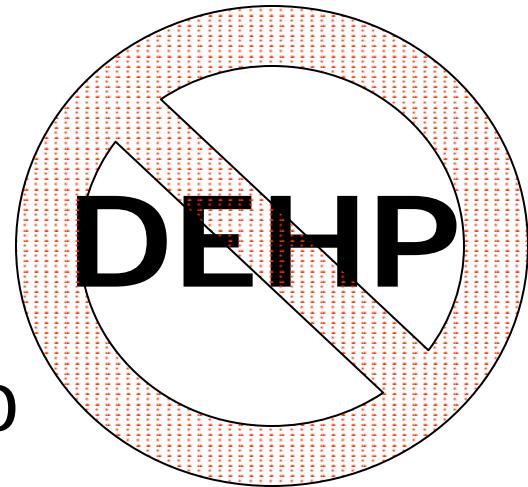
- October, 2000: US Department of Health, National Toxicology Program
- March, 2001: CA Medical Association Resolution: Eliminate DEHP in Neonatal Intensive Care Units
- July, 2002: FDA Public Health Notification



FDA Public Health Notification

Recommends:

- Using alternatives to DEHP-containing products for procedures with excessive exposures
- Reformulation of products to decrease/eliminate DEHP exposures
- Labeling of DEHP-containing products



FDA Safety Assessment

- FDA derived a “tolerable intake” (TI) for DEHP
 - Parenteral: 0.6 mg DEHP/kg/day
 - Oral: 0.04 mg DEHP/kg/day
- TI calculations based on NOAELs and LOAELs from numerous animal studies of testicular toxicity



DEHP Exposures

mg/kg/day	Adult		Neonate	
	DEHP dose	TI/dose	DEHP dose	TI/dose
IV: crystalline	0.005	120	0.03	20
IV drugs w/vehicles	0.15	4	0.03	20
TPN (lipid)	0.13	5	2.5	0.2
Enteral nutrition		< 1.0	0.14	0.3
ECMO	3.0	0.2	14	0.04
Exchange Transfusion			22.6	0.02





Photo: Valerie Briscoe, JMMC

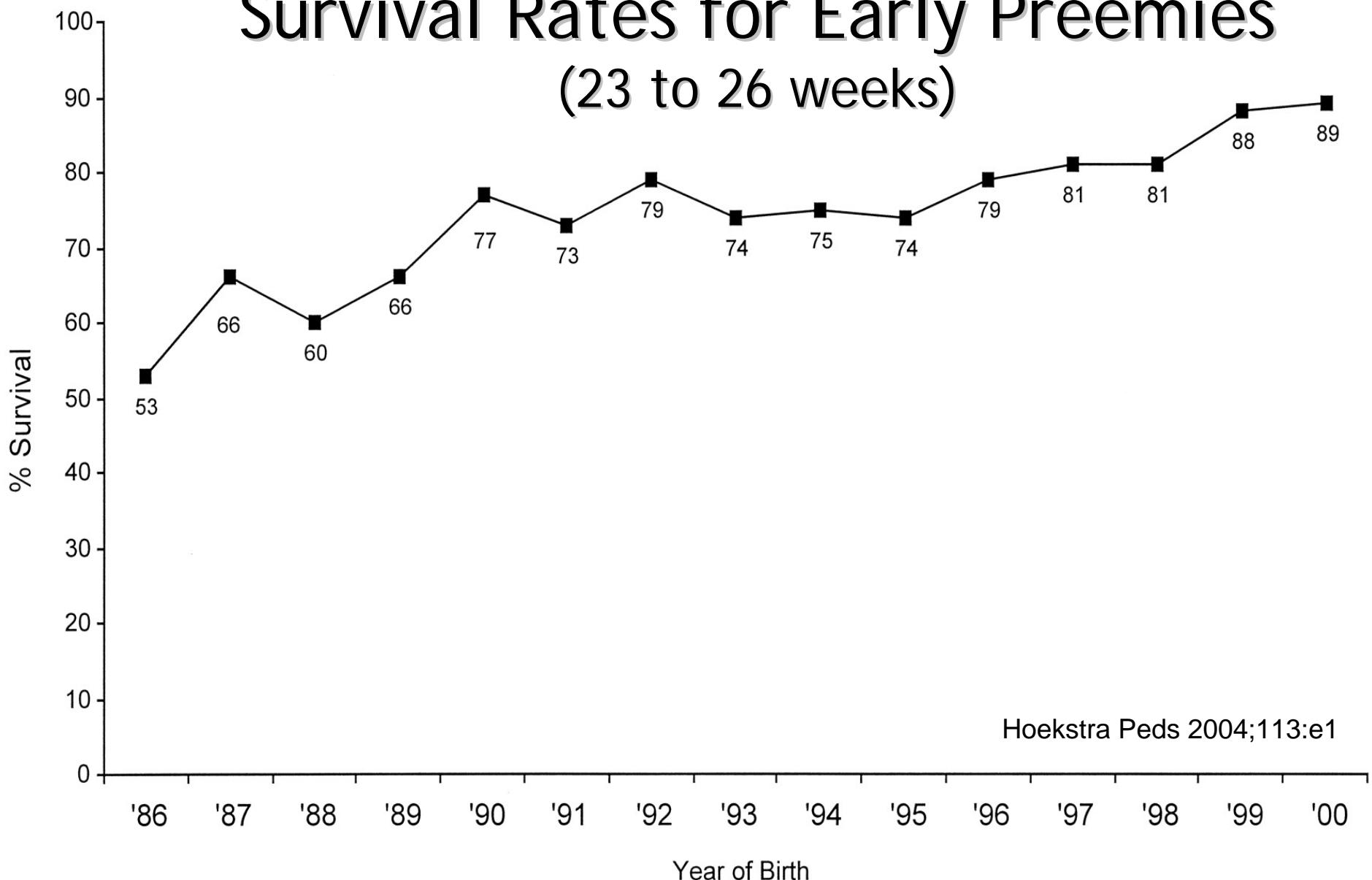
Focus: High Risk Areas

Early Preterm Infants

- Critically ill patient population
 - IV therapy
 - Parenteral and enteral feedings
 - Ventilation
 - Blood transfusion
- Long hospital stay
 - Prolonged therapies



Survival Rates for Early Preemies (23 to 26 weeks)



Most Sensitive System:

Immature Male Reproductive Tract

- MEHP is the toxic metabolite
- Mechanism of Action
 - Decrease testosterone synthesis; interference with Leydig cell differentiation
- Target Tissues
 - Sertoli cells
 - Seminiferous tubules, sperm, epididymis, penis, prostate (fetal exposures)



PVC/DEHP-Containing Products

Gloves

- ✓ Exam
- ✓ Surgery

Bags

- ✓ IV
- ✓ Nutrition
- ✓ Blood

Tubing



Gloves

Low risk: not typically invasive or long-contact



1. Latex
2. Nitrile
3. PVC (usually marketed as latex-free)
 - ❖ Parallel efforts to eliminate latex gloves because of allergies...

...but “latex-free” usually means PVC/DEHP



Gloves - Alternatives

- ✓ Use powder-free latex or nitrile
- ✓ Examine life cycle costs and performance of PVC gloves

...Tufts/1999 Kaiser Studies:

- Failure Rate:
 - PVC 30%
 - Nitrile/Latex 2%
- Staff use “double-gloving” for extra protection
- Nitrile/Latex gloves are cost competitive



Tubing



High-risk: long contact, conveys air and fluids, some high volume

- PVC less prone to kinking
- Becomes more brittle with use as DEHP leaches



Tubing - Alternatives

- ✓ Focus on tubing used to introduce fluids/gases into the patient
- ✓ Examine tubing upstream of equipment: e.g., wall to ventilator



Respiratory Therapy Ventilator



IV Bags

High risk: long contact,
some lipid fluids, some
high volume

- PVC/DEHP-free alternatives available
- Driven by demand
- 3 Vendors: Baxter, Braun, Hospira (Abbot)



IV Bags - Alternatives



- B Braun is the only current supplier of PVC/DEHP-free bags
- PVC bags:
 - Require an “overwrap” to preserve shelf life
 - Are thicker/heavier than alternatives

B Braun DEHP-free bags are cost competitive;
10-20% more expensive



Nutritional Bags - Alternatives

- Market demand exists:
 - Baxter: EVA (no-PVC)
 - Hospira (Abbot): PVC but w/o DEHP
 - Each has about 40% market share

PVC/DEHP-free alternatives are cost competitive



Blood Bags

- Blood Bank Users:
 - Few PVC/DEHP-free bags available/used
 - DEHP used as a preservative



Tackle other areas first; raise awareness among blood banks/public



JMMC DEHP Reduction Plan

1. Establish DEHP reduction policy for NICU
2. Implement reduction plan
 - a. Get list of all supplies from Purchasing Dept.
 - b. Audit supply room and identify plastics used in “high-risk therapies.”
 - c. Purchasing Dept. contacts manufacturers to determine DEHP content
 - d. Nursing and respiratory therapy staff evaluate alternative based on clinical applicability and efficacy
 - e. Preferred product list sent to Purchasing Dept.
3. Expand program



JMMC Success Factors

- Easily identified “Cause Champion”
- Changes occurred “under the radar”
- Cost not a large factor
- Readily available alternatives for most products

➤ Effort required:

- 40 hours primarily by nursing supervisor over 1 year



Problematic Areas

- Premixed IV solutions
 - Parenteral solutions mixed by pharmacy in non-DEHP bags
- Blood Bank
 - Red Cross blood products uses blood bags containing DEHP





JMMC Plastic Products

Item #	Description	Cat#	DEHP?	Manufacturer
9906	Long-life feeding Tube	730709	No	Children's Medical Venture
5420	Dispensing pin with valve	3548441 3500	No	B. Braun
2695	Neonatal catheter	2184-00	No	Vygon



JMMC Plastic Products

Item #	Description	Cat#	DEHP?	Manufacturer
34257	Soluset- Microdrip	00131194802	Yes	Abbott
1843	Butterfly Inf 19 X 7/8 X 12	00134590010 1	Yes	Becton Dickinson
3094	Transducer Transpac	00154256001	Yes	Abbott
13062	Tray Exchange Transfusion	07055004110	Yes	Pharmaseal Allegiance

JMMC Plastic Products

Item #	Description	Cat#	DEHP?	Manufacturer
34257	Soluset- Microdrip	19231-12	No	Abbott-new item
1843	Butterfly Inf 19 X 7/8 X 12	00134590 0101	Yes	Becton Dickinson-use for blood <u>drawing</u> -no risk
48795	Transducer	MX20775	No	Medex-New Item
13062	Tray Exchange Transfusion	07055004 110	Yes	Pharmaseal Allegiance- No alternative. No longer used, change in practice



NICU Replacement Summary

- Survey found:
 - 31 plastic items
 - Only 5 contain PVC/DEHP and are used in exposure scenarios
 - Others are used for extraction procedures
 - One was eliminated procedurally

Only 4 items need to be replaced



LOT NUMBER

33G210044

+H365MX453HL05



+S33G2100445W"

**Non-DEHP T Connector
w/Swivel M.L.L.**

SINGLE USE

STERILE

CONTENTS: STERILE
AND FLUID PATH NONPYROGENIC UNLESS
PACKAGE IS DAMAGED OR OPENED.

SLIDE CLAMP IS SPECIFICALLY DESIGNED FOR EASE OF REMOVAL. PREVENT INADVERTENT REMOVAL.

CAUTION: Federal Law (U.S.A) restricts this device to sale by or on the order of a physician.

Latex Free

0618

MADE IN



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DEHP Resources

- Sustainable Hospitals:
www.sustainablehospitals.org
- Health Care Without Harm:
www.noharm.org
 - Audit Form:
<http://noharm.org/details.cfm?type=document&id=741> :
 - Alternative List:
<http://www.noharm.org/details.cfm?type=document&id=591>

