Health Care Without Harm

Chemicals of concern in Healthcare products

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Healthcare organisations have social, economic and environmental responsibilities
“Hazardous chemicals are often present in medical devices to improve plastic performance e.g. plasticisers, flame-retardants, fillers, colourings, impact modifiers, and stabilisers. These harmful chemicals can represent a high percentage of the final product (in some case up to 80%) and can lead to products and have adverse effects on human health and the environment.”
• What adverse effects?
• Effects on who?
• Why didn’t I know this?
Marjorie Gordon, a radiographer from New Zealand, was the first to report a variety of health complaints from exposure to medical imaging chemicals. Gordon reported symptoms including heart arrhythmias and tachycardia, sore throat, nausea, headaches, fatigue, and other complaints. It was believed that these and other symptoms such as asthma, upper airway irritation, and laryngeal dysfunction are the result of gradually increasing sensitivity to one or more film processing chemicals.
Health and environmental impacts of hazardous chemicals

- Toxicity (e.g., carcinogen, mutagens, reproductive hazards)
- Endocrine disrupting chemicals (EDCs)
- Neurotoxicity, developmental toxicity and immuno-toxicity
- Allergenicity/asthmagenicity
- Sensitiser
- Skin and eye irritants
- Environmental determinants linked to:
  - Persistent and bioaccumulative toxicants (PBTs) in the products
  - Acute and chronic aquatic toxicity
Each participant had at least 24 individual chemicals in their body, and two participants had a high of 39 chemicals detected.

Eighteen chemicals were detected in every single participant.

All 20 participants had at least five of the six kinds of chemicals for which were tested, and thirteen of participants had all six.
The plastic revolution in healthcare

1960s introduction of PVC plastic syringes and disposable needles introduced to the American and European markets by Becton Dickinson, Jelco (a division of Johnson & Johnson), Deseret and other manufacturers

Endocrine disrupting chemicals (EDC)

- EDCs are chemicals or mixtures of chemicals like DEHP (Di(2-ethylhexyl) phthalate) is widely used as a plasticizer for PVC in such as footwear, building materials and floor coverings and to make medical devices pliable.

These interfere with the way the body’s hormones work:
- "hormone mimics“
  - block natural hormones
  - increasing or decreasing the levels of hormones in our blood by affecting how they are made, broken down, or stored in our body.
  - change how sensitive our bodies are to different hormones.
Bisphenol A (BPA)

- BPA-based plastic is made into a variety of common consumer goods, like water bottles, sports equipment, CDs and DVDs.
- Epoxy resins containing BPA are used as coatings on the inside of many food and beverage cans.
- BPA is in the lining of tubing and blood bags like intravenous administration sets, stopcocks, syringes, intravascular catheters, urinary catheters, gastrointestinal tubes, cardiopulmonary bypass circuits, eye lenses, tubing, blood oxygenators and dialysers, surgical trays, nebulizers, humidifiers, haemodialysis membranes dental composite resins, dental sealants and coating for medical devices.

May be harmful if swallowed or in contact with skin causing an allergic skin reaction
- Suspected of damaging fertility or the unborn child
- Causes damage to organs through prolonged exposure
- Toxic to aquatic life
Poly- and perfluoroalkyl substances (PFAS)

• PFAS are ‘forever chemicals’ used in products to improve their durability and increase their shelf life.
• They are widely used as they are stable under intense heat. Many of them also have surfactant properties and function as water and grease repellents.
• Major industry sectors using PFASs include aerospace and defence, automotive, aviation, food contact materials, textiles, leather and apparel, construction and household products, electronics, fire-fighting, food processing, and medical articles.

  May be linked to potential health issues like kidney cancer and thyroid disease.
The issue:

Medical devices are an essential feature of modern healthcare, playing a critical role in the diagnosis, monitoring, and treatment of diseases.

Modern medicine is totally reliant upon these devices yet have limited knowledge about the materials and chemicals used in their production.

Pharmaceuticals administered in medical interventions are subject to significant scrutiny and regulation.

The materials currently used in medical devices often are not.
New words, new challenges

- Polyvinyl Chloride
- Phthalates
- DEHP
- Bisphenol A (BPA)
- EDCs

- Chemical impact on health from medical devices
- Impact of procurement decisions on the emissions from healthcare
- Inability to recycle plastics
Those at most risk

55% senior neonatologists had no info about phthalates in NICU
“By early 2012, we were able to convert virtually all of our IV medical equipment, including more than 9 million solution bags to PVC- and DEHP-free alternatives”

Cathy Gerwig
Greening Health Care
Conversion to DEHP-free IV administration sets

(KP California and Hawaii regions use approximately 3 million sets per year)
Unethical silence?
Safe use of medical devices with DEHP

MHRA is aware of some issues with plastics that contain DEHP, including:

- the possibility of the DEHP leaching from the PVC into solutions like blood or nutrition formulas
- birth defects and infertility in animals with certain doses of the phthalate
Scientific Committee on Emerging and Newly-Identified Health Risks (SCENIHR) conclusion

According to SCENIHR in 2015 there is inconclusive or inconsistent evidence to suggest that medical devices containing DEHP pose an unacceptable health risk to humans, specifically to the reproductive health of men.

The report shows that medical devices containing plasticised PVC with DEHP have an important clinical benefit.

The committee stated that the potential for replacement of DEHP in these products should be considered against their efficiency in the treatment, as well as the toxicological profile and leaching properties of alternative plasticiser materials. The report stated that there is a strong need to develop and collect information about exposure to alternative materials in the conditions of use, to refine the knowledge on their toxicological profile and to develop other alternative materials with a favourable profile for both efficiency and safety.

Advice at 5 November 2022
The WHO Global analysis of health care waste in the context of COVID-19 bases its estimates on the approximately 87,000 tonnes of personal protective equipment (PPE) that was procured between March 2020- November 2021.
Surgical face masks, gloves, and gowns are commonly manufactured from plastics that break down slowly, such as polypropylene, polyurethane, polyacrylonitrile, polyethylene, and polyethylene terephthalate. A surgical mask made from these materials could take 450 years to fully decompose.
“Sustainability is an important and legitimate domain of quality in healthcare, which calls for the redefinition of value to incorporate social and environmental costs.”

Sustainability in quality improvement: redefining value
Authors: Frances Mortimer et al

1. PREVENTION
promoting health and preventing disease by tackling the causes of illnesses and inequalities

2. PATIENT SELF-CARE
empowering patients to take a greater role in managing their own health and healthcare

3. LEAN SERVICE DELIVERY
streamlining care systems to minimise wasteful activities

4. LOW CARBON ALTERNATIVES
prioritising treatments and technologies with a lower environmental impact.

Four principles of SUSTAINABLE HEALTHCARE

http://www.clinmed.rcpjournal.org/content/10/2/110.full
GREEN TEAM + SUSTAINABLE IMPROVEMENT
What can you do?

• Question suppliers about their products
• Support environmental awareness locally
• Connect with your QI colleagues within your organisation to remove waste
• Encourage a ‘green’ metric in every project – big or small
• Give evidence to the influencers to encourage them to take action
• Help staff to get involved and do ‘something’
• Share stories to make it real
LOVELY!

She was certainly an exquisitely lovely creature. Nothing could have been added to enhance her beauty. She compelled admiration, and was an object of worship. This is the universal result of the use of DR. CAMPBELL'S SAFE ARSENIC COMPLEXION WAFERS and Fould's Medicated Arsenic Complexion Soap.

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Thank you!
References and resources:


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• NHS England/Improvement (2020) *Delivering Net Zero NHS Plan Green*

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