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Evidence based glove selection in healthcare

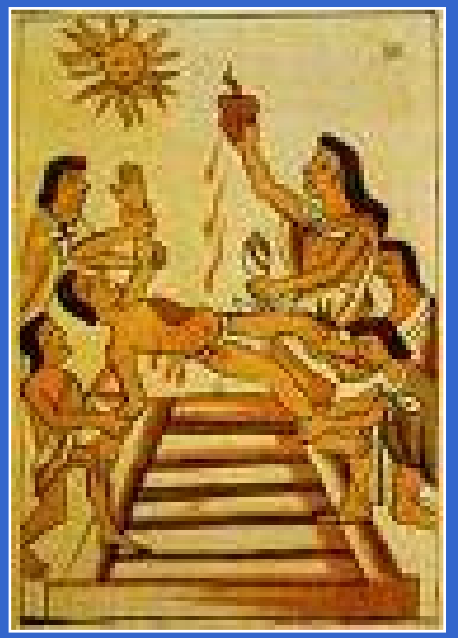
and the management of latex allergy

Glove use and sensitisation to Latex Gloves

- **Key Learning Objectives**
  - Discuss a brief history of glove manufacture and use
  - Discuss the causes of sensitivity to NRL and Synthetic gloves
  - Consider how European Healthcare employers have managed the issue of glove use and selection
  - Discuss the key findings of the NHS Plus and RCP publication on Latex Allergy: Occupational Aspects of Management
  - Consider the prevalence of reactions to NRL in healthcare staff
  - Discuss evidence based glove selection and use

From the Aztecs, to the bowels of a sheep…

- Olmec – “rubber people" in the Aztec language 1600 BC



- 1758 John Walbaum
  - Obstetrician
  - Gloves from the small bowel of a sheep!

….to powder free surgical gloves and synthetic glove materials

- 1983 – Introduction of first powder free NRL surgical glove
- 1996 – **Synthetic polychoroprene** surgical glove launched. Material used primarily for surgical gloves and occasionally for the manufacture of examination gloves. Provides a good barrier protection against viral penetration.
- **Polychloroprene** has many of the qualities of latex (e.g. fit, feel, comfort), and can be manufactured using the same methods. It can be used when a latex-free environment is required.

- **2003 - Polyisoprene** surgical glove launched - Synthetic polyisoprene, has an identical polymer structure to natural rubber latex, used for surgical gloves.

- Does not contain natural rubber latex proteins it is suitable for use by/for those who have a known or suspected allergy to natural rubber latex.

- 2007 - ‘Softer Latex’ gloves

When should we wear gloves?

- Contact with blood and body fluids
- Contact with sharp instruments
- Contact with non-intact skin
- Contact with mucous membranes
- Contact with sterile sites
- During invasive procedures

[ICNA 2002]

Navigating The Glove Maze:

An Algorithm To Assist Perioperative Theatre Staff To Select The Right Glove For The Right Procedure

This algorithm has been developed by an independent working party in order to encourage best practice in the selection of gloves in the operating theatre environment. It was supported by an educational grant from Mölnlycke Health Care. The following healthcare professionals took part in the working party's deliberations:

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When Should Gloves Be Used?

Are Gloves Really Necessary?

No

Gloves are **NOT** required for procedures where there is minimal risk of cross-infection between patients and staff [refer to local hand hygiene protocols (see box 6)].
e.g.
- basic care procedures without contact with blood/bodily fluids
- taking recordings (e.g. blood pressure, temperature, pulse)
- closed entrotracheal suction

- **Inappropriate or unnecessary use of latex gloves (e.g. in non-sterile settings) may increase risk of latex sensitisation, with life-threatening consequences (see box 4)**
- **Prolonged use of any gloves may increase the risk of contamination and cross-infection**

Yes

Gloves **ARE** required for procedures where there is a risk of cross-infection between patients and staff

Is there a high risk of exposure to blood or bodily fluids?

NO – use non-sterile vinyl (e.g. for examination purposes)

YES – is a sterile field required?

NO – use non-sterile nitrile or synthetic glove with equivalent barrier properties.

YES – use low protein powder free latex glove in the operating theatre and sterile nitrile in non-operative settings (e.g. wards, ICU, A&E, suturing, central venous lines)

Single/Double Gloving For Surgery and Invasive Procedures

Is There a High Risk of Glove Perforation?

No

Procedures with a lower risk of glove perforation include:
- soft tissue
- superficial cavity
- minimally invasive (e.g. laparoscopy)
- procedures lasting < 1 hour

- **However, remember that although the perforation risk may be lower, it is still significant**
- Any glove perforation arising from the use of sharps (whether in high- or low-risk procedures) carries the risk of needlestick injury and transmission of infection (e.g. hepatitis B, hepatitis C, HIV/AIDS, blood-borne viruses)
- It is for you and your Trust to decide whether or not these risks are acceptable and to what extent other issues (e.g. cost, litigation potential) should influence single- or double-gloving decisions

Yes

Procedures with a high risk of glove perforation include:
- bone and metal work
- deep cavity
- confined spaces
- procedures lasting > 1 hour
- perforation risk increased in procedures involving bone cement

- 88% of punctures go unnoticed[2]
- 38% of punctures sustained during surgical proceedures lead to contamination of the surgeon's hand[3]
- Double gloving reduces perforation risk and is the minimum recommendation for all high-risk procedures[1]
- Use of a colour-coded, puncture-indicating system enables glove wearers to detect perforation more easily

DON'T FORGET - UNNECESSARY PROLONGED USE OF GLOVES INCREASES THE RISK OF CROSS INFECTION AND CONTAMINATION. DISPOSE OF GLOVES AS SOON AS POSSIBLE AFTER PROCEEDURE IN HAND HAS BEEN CONCLUDED.

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When should we wear gloves?
Health and Safety Executive – UK, 2009

- "Single use disposable natural rubber latex gloves may be used where a risk assessment has identified them as necessary. When they are used they must be low-protein and powder-free"
- "In many situations a risk-assessment will suggest that in the presence of a risk of blood-borne pathogen transmission…NRL is the safest choice of material provided the worker and patient are not sensitised to this"
- "If a person is sensitised to NRL proteins, NRL-free gloves and equipment must be used"
- "NRL has many benefits which are yet to be equalled where there is a requirement for specific tactility and dexterity qualities"

Adverse Skin Reactions to the use of gloves – What was the problem?

- Emergence of HIV during late 1980's increased use of powdered NRL gloves
- Over use of the reliance of gloves as PPE

  Gloves with high levels of proteins and accelerators

  Increased incidence of sensitivity to NRL

Irritant Contact Dermatitis

- Dryness or cracking of the skin in the areas exposed to glove.
- Tends to be chronic though improves when the glove is not worn and is a non-allergic reaction.
- Factor when a powdered latex glove is used were the cornstarch powder damages the skin by friction and causes drying of the skin.

Type IV (Allergic Contact Dermatitis)

- Pre disposing factors – allergies to nickel, perfume.
- Allergy to the accelerator agent used in the manufacturing process of natural rubber latex products
- Symptoms include redness, itching, cracking and thickening of the skin in areas where exposure to the latex glove is apparent. The skin may also become leathery and express papules.
- Reaction commonly occurs between 6-48 hours after contact with the gloves and is always localised to the hands.

Type I
(Immediate Hypersensitivity)

- IgE hypersensitivity to latex proteins in individuals with latex-specific IgE antibodies from previous exposure and sensitisation.

- Clinical manifestations range from contact urticaria, itching of the skin and eyes, sneezing, bronchospasm and asthma to anaphylaxis, and these may occur in people previously unknown to be sensitised.

PPE and Medical Devices

- **PPE** - covers any item intended for wearing or carrying by the worker with the aim of protecting them from one or more risks likely to cause injury or jeopardize health while at work – Protection of the HCW

- **Medical device** - a product which is used for medical purposes in patients, in diagnosis , therapy or surgery – Protection of the patient

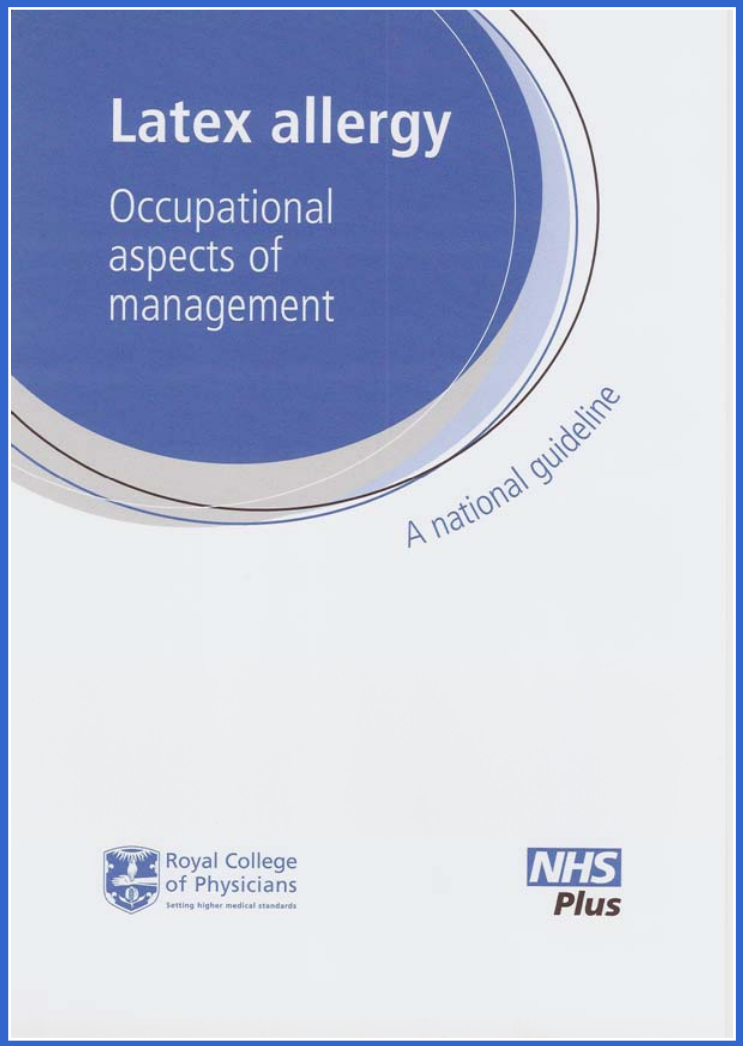
Legal Regulations - Occupational Skin Protection

- Council Directive 89/656/EEC Minimum Health and Safety Requirements for the use by workers of Personal Protective Equipment at the workplace.
- Personal protective equipment must comply with the relevant Community provisions on design and manufacture with respect to safety and health.
- All personal protective equipment must:
- **(a) be appropriate for the risks involved, without itself leading to any increased risk**

Legal Regulations - Occupational Skin Protection

- HSE – UK 1992 - Personal Protective Equipment at Work Regulations 1992
- Poland – Working with substances sensitising potential prohibited for young people
- Norway – special measures for wet work
- Denmark – 2 day training course when working with epoxy resins
- Swedish Work Environment Agency 1991 – use of Personal Protective Equipment
- Germany TRGS 540, (1999) – Only Low – Allergen Powder Free NRL Gloves allowed in the workplace – 2001, 75% less suspected latex allergies compared to 1999.

The evidence base for Glove Use



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Latex allergy: Occupational aspects of management

- A systematic review of the current evidence on sensitisation to NRL
- To assist occupational health professionals, and healthcare employers parties in providing advice on occupational health interventions to address the problem of latex allergy
- Review was concerned particularly with issues relating to gloves, as these represent by far the main occupational use of latex.
- The main focus of the review was on Type I or immediate-type allergy to latex proteins, which had a reported prevalence of up to 17% in certain occupational groups.

Sensitisation to NRL
- how big is the problem?

- Mid -1980s, latex allergy became a major occupational hazard in the healthcare industry (Bousquet,2006) [Powdered Gloves]
- Prevalence of Type I allergy (based on skin prick testing) in occupational groups (Turjanmaa 2002) [Powered Gloves]
  - 17% in food handlers and hairdressers
  - 17% in healthcare workers
  - 6% in painters
  - 7% in construction workers
  - 4% in cleaners

Prevalence of Sensitisation to NRL

- True prevalence of latex allergy amongst UK healthcare workers, probably rare (Cullinan, 2004)

- No reports of new cases of latex allergy arising from non-powdered low protein latex glove use were found.
  - » (NHS Plus, Royal College of Physicians 2008)

- 95% of work related dermatoses are subtypes of contact dermatitis
  - » Hogan, Tanglertsampan.1992

Heirachy of Prevalence of Sensitisation to NRL gloves

- Irritant Contact Dermatitis

↓

- Allergic Contact dermatitis

↓

- Immediate Sensitivity

Latex allergy: Occupational aspects of management

- **No reports of new cases of latex allergy arising, when non-powdered low protein latex gloves were used.**

- The evidence **does not therefore support a complete ban on the use of latex gloves**.

- Hospitals should assess whether their needs would be met better by:

- The use of latex-free or powder-free latex gloves

- Or use of both in different settings, while taking into account the desirable and undesirable properties of both materials.

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Latex allergy: Occupational aspects of management

- Powdered latex gloves should therefore **not** be used in the workplace
- National and local policies that encourages switching from powdered latex gloves to powder-free low protein latex gloves is a proven effective method of reducing the incidence of latex allergy

Should health care employers go Latex Free?

- What is leading them to consider this?
  - Fear of litigation?
  - Cost?
  - Why should they?
    - What is the evidence base?

The cost of ineffective glove selection…

- The Princess Alexandra Hospital NHS Trust, Essex, England, fined €12,000 after pleading guilty to two health and safety charges
- HSE inspectors visited the Hospital in November 2007 and found the hospital was not correctly managing the risk of staff becoming sensitised to latex, mainly from latex gloves. (Type IV)
- The first notice required the Trust to carry out a suitable and sufficient risk assessment of the use of latex and the second notice was issued to control the risks identified
- Inspectors also discovered the Trust had failed to report that a member of staff had been diagnosed as having latex-linked occupational dermatitis. (Allergic Contact Dermatitis).

Patient Safety

- 28% to 67% of children with spina bifida have a positive skin test result to latex proteins indicating increased blood levels of IgE antibody.
  (GL Sussman, DH Beezhold - Annals of internal medicine, 1995)

- Atopic patients and Healthcare Staff
  - Asthma, Eczema - Glove Selection!
  - Pre employment Health Assessment

The risks of a Latex Free Environment

- **The evidence base…**
- **Latex allergy: Occupational aspects of Management**
  - Gloves manufactured from NRL, are durable flexible, giving wearers dexterity, sensitivity, and microbiological protection.
  - Gloves manufactured from a synthetic material have a lower tensile strength and barrier protection may be compromised.
  - Incidence of Type IV sensitisation

The risks of a Latex Free Environment
Glove Perforation Rates

Study	NRL Gloves	Non Latex Gloves
Korniewicz et al August 2004	6.9%	8.4%
Aldlymani et al 2009	34.4%	80.0%

Best practice in glove selection

- The selection, purchase and use of gloves should be evidence based
- The NHS Plus review of the scientific evidence provides a powerful argument for Healthcare employers **not to be bullied into adopting a latex free strategy**
- It is ill advised for Healthcare employers to withdraw NRL gloves across all areas, including surgery, as a knee-jerk reaction for fear of litigation

Best practice in glove selection

- Policies should ensure that operating theatre staff have the best possible protection from Needlestick injuries and Blood Borne Viruses

- Healthcare employers should assess the true incidence of sensitisation and chemical allergy and glove policies, adopting a risk assessment process which takes account of the occupational risk and control measures required.

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References and further reading

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Stockholm November 2009