RCoA
Royal College of Anaesthetists

WINTER SYMPOSIUM
3–4 December 2020

Anaesthetists in mind

Chair: Dr Lucy Williams

A study of theatre ergonomics
Dr Richard Marks

Wellbeing
Dr Nancy Redfern

A Study Of Theatre Ergonomics

Dr Richard Marks
Department of Anaesthesia
Sheffield Teaching Hospitals NHS Trust

Theatre Ergonomics Project

- Perceived high number of colleagues with severe degenerative disc disease
- 15 Total spinal surgical procedures in 104 current Consultant Anaesthetists
- Qualitative evaluation of our NGH theatre layout. (2016-2017)

A Pain In The Neck

"After a few weeks there it became clear that the ache and tingling in my C6 distribution was worse than some of our patients'……

Dr A Hunnigher Trainee Anaesthetist
(Royal National Orthopaedic Hospital Stanmore)

Royal College Bulletin (2009) November 58 p13-14

Prevalence of Work-Related Musculoskeletal Disorders Among Surgeons and Interventionalists:

- Meta Analysis prevalence of degenerative disc disease of 15 to 20%
- Highly Specialty specific
- Problem poorly recognized in US

Epstein S, Emily H. Sparer EH, Lee BT
JAMA Surg (2018) 153(2)

Prevalence of Work-Related Musculoskeletal Disorders Among Surgeons and Interventionalists:

- "Epidemic" "Tip of the Iceberg"
- Huge implications for loss of highly trained specialists
- Urgent Need for Research

Epstein S, Emily H. Sparer EH, Lee BT
JAMA Surg (2018) 153(2)

Upper limb disorders in anaesthetists – a survey of Association of Anaesthetists members:

- 3,884 Association members (40% response)
- Cervical disc prolapse in 24%
- Right-handed 90% Left-handed 10%
- 'Commoner' in Right-handed

Leifer S, Choi SW, Asanati K, Yentis S.
Anaesthesia March (2019) 74:3 285-291

Upper limb disorders in anaesthetists – a survey of Association of Anaesthetists members[†]

''Possible 'modifiable' ergonomic factors in design of environment or equipment worthy of further investigation''

Leifer S, Choi SW, Asanati K, Yentis S.
Anaesthesia March (2019) 74:3 285-291

Intervertebral Disc Functional Histology:

- Water held in fibrous matrix by osmotic attraction to glycose-amino-glycans
- Highly organized matrix

Intervertebral Disc Functional Histology 2:

- Rise in disc pressure > osmotic pressure water squeezed out
- Disc surface low friction

Activity and Intervertebral Disc Forces:

- *Excessive Load:* Increased Disc pressure
- *Twisting / turning*: Shearing of matrix
- *Bending:* Reduced surface area and number
- *Extended static posture*: Force increase

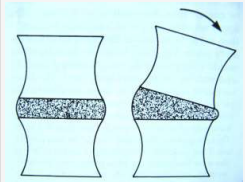


Fig 1 A soft disc capable of changing shape is placed between adjacent vertebrae. This permits the rocking motion required for forward, back and side bending of the spine. Bogduk, 1987, page 14

Pressure = Force / Area

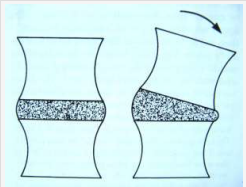


Fig 1 A soft disc capable of changing shape is placed between adjacent vertebrae. This permits the rocking motion required for forward, back and side bending of the spine. Bogduk, 1987, page 14

Area = total number of discs

Surface Area and Intervertebral Disc Pressure:

- *Increased angulation of spine results in force over smaller net area*
- *Damage to discs increases pressure on intact discs*

Recognised Risk Factors For Occupational Back Injury

- Excessive Load
- Twisting / turning
- Bending
- Extended static posture
- Whole body vibration

Seidler A. Occupational risk factors for symptomatic lumbar disc herniation; a case-control study. Occupational & Environmental Medicine (2003) **60**:821–830

What does the law say?

- avoid hazardous manual handling operations so far as reasonably practicable;
- assess any manual handling operations that cannot be avoided;
- reduce the risk of injury to as low as reasonably practicable.

HSE Health & Safety Executive

Sheffield Theatre Ergonomics Project

- Qualitative analysis of our practice against established risk factors.
- Mapping of Anaesthesia as 'Work-station' Activities to recognized causes of disc prolapse.
- Are there modifiable factors for reducing MSK risk?

Display Screen Equipment:

- HSE definitions Anaesthetists are 'heavy' (DSE) users
- Approved Adjustable Seating with lumbar support
- Screen height and angle adjustable
- No bright lights on screen surface
- Desk height and angle adjustable

Work with display screen equipment. Health and Safety Regulations 1992 Guidance on regulationsL26 (2nd edition) HSE Books 2003 ISBN 0 7176 2582 6

Display Screen Equipment

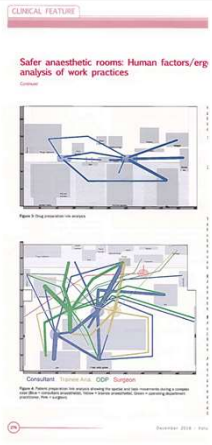
Workplace Assessment
Induction Rooms

- Location of items to sink (SAS)
  - Gloves
  - Towel Holder
  - Refrigerator
  - Cupboards
  - Sharps Bin

SAS
Sink Association Score

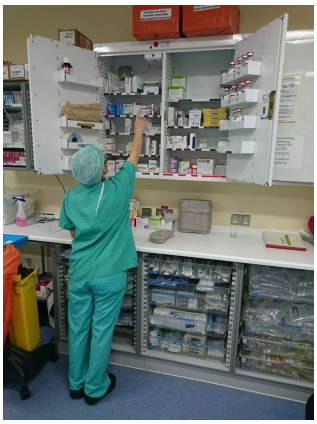
Workplace Assessment
Induction Room 2

- Is the monitor within a 90 degree quadrant whilst observing the patient?
- Is the monitor compliant with HSE recommendations?
- Is it possible to cross the room if bed rotated 90 degrees?



Safer Anaesthetic Rooms
J. Perioperative Practice
(2016) 26 12 274-80

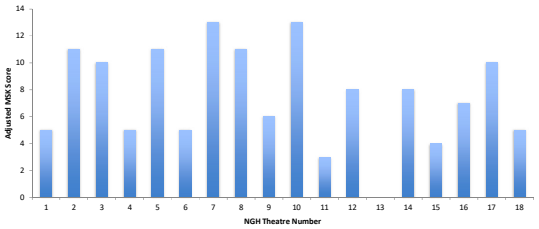
Induction Room Video Analysis



Workplace Assessment
Operating Theatre

- Is the monitor visible within a 90 degree quadrant whilst observing the patient?
- Is the monitor compliant with HSE?
- Is there a chair compliant with HSE?
- Is writing / keyboard HSE compliant?

Adjusted MSK Relative Risk Scores: NGH Main Theatres Sheffield



R R D Marks Data Risk Assessment STH Theatres

Theatre Ergonomics

- Large variation in the same equipment in adjacent theatres
- Lack of induction room space
- Poor induction room monitor placement
- Unsuitable seating

What does the law say?

- avoid hazardous manual handling operations so far as reasonably practicable;
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HSE Health & Safety Executive

HSE Health and Safety Executive

Manual handling assessment charts (the MAC tool)

This is a web-friendly version of leaflet INDG383(rev2), published 08/14.

Introduction

Work-related musculoskeletal disorders (MSDs), including manual handling injuries, are the most common type of occupational ill health in the UK. It is important to remember that:

- **there is a lot you can do to prevent them;**
- **preventative measures are often simple and cost-effective;**
- **you cannot prevent all MSDs, but where they occur, early reporting of symptoms, proper treatment and suitable rehabilitation are essential.**

The Manual Handling Assessment Charts (MAC) is a tool aimed at employers, health and safety managers and safety representatives and is used by health and safety inspectors. The tool will help individuals to assess the most common risk factors in lifting (and lowering), carrying and team handling operations and was developed to identify high-risk manual handling.

What does the law say?

The Manual Handling Operations Regulations 1992 set out a clear hierarchy of measures for dealing with risk likely to cause harm from manual handling. These are:

- avoid hazardous manual handling operations so far as reasonably practicable;
- assess any manual handling operations that cannot be avoided;
- reduce the risk of injury to as low as reasonably practicable.

Structure of the MAC

There are three types of assessment that can be carried out with the MAC:

- lifting operations (pages 3–6);
- carrying operations (pages 7–10);
- team handling operations (pages 11–13).

For each type of assessment there is an assessment guide and a flow chart. There is a score sheet (the 'MAC Score sheet') to complete on page 14.

Note

The MAC is **not** appropriate for some manual handling operations, for example those that involve pushing and pulling. Its use does **not** comprise a full risk assessment (see Manual handling in 'Further reading'). Always consider individual and psychosocial issues when completing the 'MAC Score sheet'. Also, the MAC is **not** designed to assess risks associated with workplace upper limb disorders (see Upper limb disorders in the workplace and Assessment of Repetitive Tasks of the upper limbs (the ART tool) in 'Further reading').

HSE Health and Safety Executive

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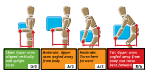
Page 1 of 15

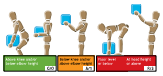
B Horizontal distance from the lower back

Observe the task and examine the horizontal distance between the operative's hands and their lower back. Always assess the 'worst case scenario'. Use the following to guide your assessment:



C Vertical lift region

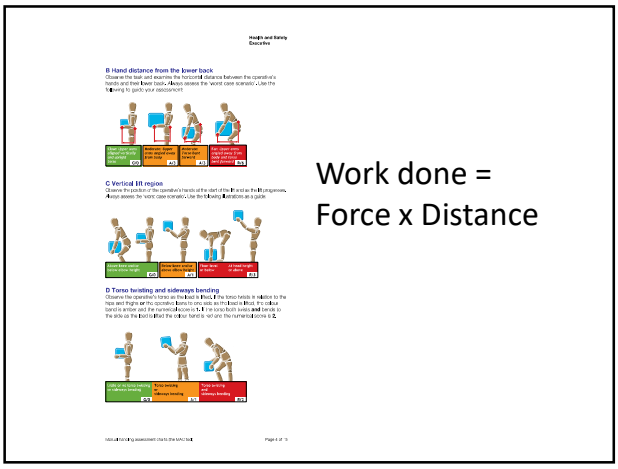
Observe the position of the operative's hands at the start of the lift and as the lift progresses. Always assess the 'worst case scenario'. Use the following illustrations as a guide.



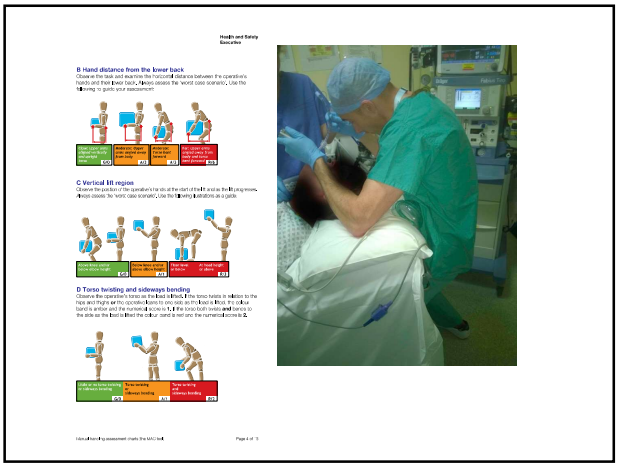
D Torso twisting and sideways bending

Observe the operative's torso as the load is lifted. If the torso twists in relation to the hips and thighs or the operative bends to one side as the load is lifted, the colour band is amber and the numerical score is 1. If the torso both twists **and** bends to the side as the load is lifted the colour band is red and the numerical score is 2.

HSE Health & Safety Executive



Work done =
Force x Distance

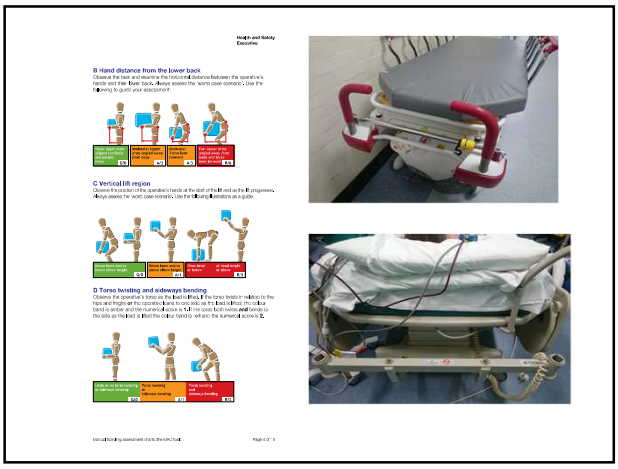


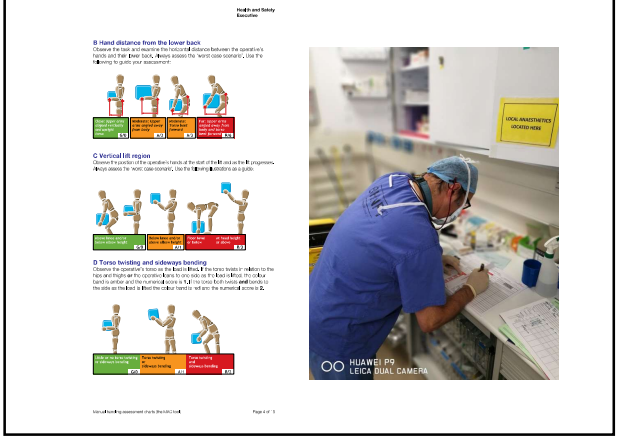
Direct Laryngoscopy
MAC Tool HSE Risk Assessment

Risk Scores ‘Red’ in Five/Seven domains

‘’Urgent Action’’HSE

STH 25,000 Laryngoscopies / year





Body posture during simulated tracheal intubation: Glidescope video laryngoscopy vs Macintosh direct laryngoscopy for novices and experts.

- Mannequin Intubation (easy mode)
- Video Analysis of posture
- Video laryngoscopy 'neutral' posture

Grundgeiger T, Roewer N, Grundgeiger J, Hurtienne J, Happel O. Anaesthesia (2015) 70:12 1375-81

Direct versus indirect laryngoscopy using a Macintosh video laryngoscope: a mannequin study comparing applied forces

- Peak force for 50% view 9 Newtons lower during video laryngoscopy than Macintosh
- Forces during difficult intubation could be much bigger difference

Gordon JK Vaughan EB Cavallin F, Parotto M Cooper RM Can J Anesth (2020) 67 515-20

"Anaesthesia" and at risk activities for disc prolapse

	Bending	Twisting	Load	Extended	
Drugs	++	++			
Cannula	++			++	
Airway			++	++	
Laryngoscopy	++	++	++	++	
Monitors		++			
Chart Hand Record	++	++			
Spinal/ N. Blocks	++	++		++	

R Marks December 2017

30 to 40 Kg

270 Kg

Improving Our Workplace

- Existing legislation
- Poor Ergonomics can hinder staff safety
- Risk Assessment of physical components of 'Anaesthesia' for staff safety


Health and Safety Executive

B Hand distance from the lower back

C Vertical lift region

D Torso twisting and sideways bending

Improving Our Workplace

- Video Laryngoscopy
- Automation of repetitive processes
- Avoid using small induction rooms
- Educational Needs
- Early intervention if problems


Slow