


## Ergonomics of NORA

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## Bad Ergonomics- You know it when you see it



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## Why do we care?

- Situation – Anesthesiologists have perceived increase in physical workload, hazardous conditions and disability
- 1999: “In recent years in the United States the number of anaesthetists who have sought disability status has risen precipitously. All these factors can impact adversely on the national manpower supply.” Jackson

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## What is ergonomics?

The study of how to improve the fit between the physical demands of the workplace and the employees who perform the work. That means considering the variability in human capabilities when selecting, designing, or modifying equipment, tools, work tasks, and the work environment. OSHA

**Goal: Avoid pain or discomfort at work and it's consequences**

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## Ergonomic challenges: Stressors

- OSHA: Awkward postures, overhead work, carrying loads, wrist deviations, contact stress, poor shoulder/wrist posture, prolonged standing or sitting, cramped spaces
- Awkward postures: reaching, bending, twisting, stretching, flexion or extension of neck and back

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## Ergonomic Challenges - Consequences

- Chronic WMSDs (Work related Musculoskeletal disorders)
  - Muscle strains, Low Back Pain, Tendonitis
  - Shoulder, Elbow and Hand Pain
  - Anesthesia providers: hand, arm, shoulder, neck most common (neck and back)
- Injuries
  - Disability – Impact on workplace

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### Personal Impact of Work Injury

- Limited or missed work
- Loss of income
- Stress, Burnout
- Loss of sleep
- Deterioration of personal relationships
- Early retirement

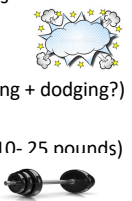
J Vasc Surg. 2019

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### Location Specifics – NORA

- Cramped spaces
  - Limited access to patient, supply cart, drugs
- Poor lighting
- Obstacles
  - Ceiling mounted equipment (are you ducking + dodging?)
  - Floor: wires, bases of equipment
- Wearing of heavy protective lead shielding (10- 25 pounds)



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### Ergonomic Challenges: NORA

Maintaining Good Posture

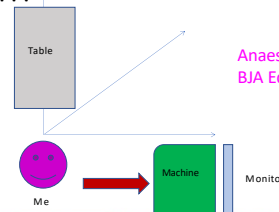
- The machine, patient and anaesthetist should be in the triangle, with each of them **within 45° from the sagittal plane within the arc of movement.**
- The anaesthetist should have a **direct line of sight** of the patient, the monitor (VS) and the video monitor(U/S) if appropriate

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### Ergonomic Challenges: NORA

- 45 degrees???



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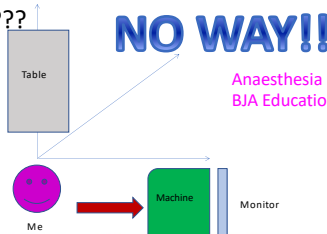
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### Ergonomic Challenges: NORA

- 45 degrees???

**NO WAY!!**

Anaesthesia 2021 BJA Education 2022




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### Ergonomic Challenges: Equipment

#### Anesthesia Machine

- Ease of **access** – **Weight**:
  - May be as much as 365 lbs without monitors
  - “Lite” machine = >220 lbs (often in NORA!) 
- East of Access – **Height**
  - Elbow at 90 degrees, neck not flexed or extended
- Ease of Access – Attachments, suction, O2

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### Ergonomic Challenges: Beds/Stretchers

**Patient beds:**

- Med/Surg bed: **450-500 lbs** (+ pt)
- ICU bed: **800 lbs** (+ pt)

**Stretchers: (+ pt up to 700 lbs)**

- Weight
  - Usual Transport: **264 lbs**
- Width
  - Standard: 30 inches – **33** inches with side rails up
  - Wide: 34 inches – **38** inches with side rails up

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### Rules of Manual Handling – Anaesthesia 2021

**Do not lift or handle unnecessarily**

**Co-ordinate a lift** If the patient's weight is a concern, take further action such as having additional handlers or hoists on stand-by

If the load, is on a height-adjustable surface, **raise it upwards** before the movement in order that all handlers remain upright during the move. **Avoid placing anything at low levels that might encourage bending.**

**Stand as close to the object being moved as possible** as this will limit any reaching. **Handling the load at arm's length results in five times the amount of stress** than is the case if the load remains very close to the trunk when it is handled.

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### Rules of Manual Handling – Anaesthesia 2021

**Stand with feet apart and with one foot in front of the other** when moving a load. This stance will offer stability to the handler. **The floor should be kept clear of cables, hoses or other pieces of equipment.**

**Use the feet to move with the load**

**Lower the upper body by flexing the knees** which results in the weight of the upper body being added to the overall lift.

**Raise the head before lifting commences.** This will assist in reducing any forward bending.

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### Good Principles (Anaesthesia 2021)

- Sufficient **space**
- **Access** to the patient should be **unobstructed** and there should be no objects impeding access to the patient
- The level of the patient relative to the anaesthetist should be adjusted in order that the **neck of the anaesthetist is NOT flexed > 60°**
- The equipment should be placed on the operator's **dominant side** in order to minimize torsion of the torso or overreaching for equipment
- Monitoring should be **clearly visible**
- Whether sitting or standing, the height of the table or monitors should be adjusted to **minimize flexion of the anaesthetist's neck, lower back and knees**

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### Solutions – Environment

GI Room 1

GI Room 2

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### NORA

WHATS WRONG WITH THIS PHOTO?

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# NORA

- Wearing lead
- GI Monitor near my head
- Breathing circuit against my hip
- Monitor w VS behind my line of sight
- Close proximity to Xray tube

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## Boom Strikes - COOH statement

- Ceiling mounted systems such as monitors, surgical equipment, lights and their supporting booms are cause
- **Head injuries are increasing** from impacting dangling objects in procedural settings
- May be severe and incapacitating, and **impacts patient safety**
- **Impairment or Incapacitation** of anesthesiologist
  - Impaired vision, hearing, bleeding, pain
  - Availability for relief of incapacitated anesthesiologist: someone may not be in building, not available, or very far away
- Anesthesiologists at risk
  - **Frequent need to make sudden and abrupt movements** to deliver care
  - **Ambient lighting typically at low levels** to increase screen visualization

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## Boom Strikes - COOH statement

- **Increase awareness** in all procedural personnel - Safety meetings
- **Reporting** of boom strike incidents
- **Identify high risk circumstances**
- **Correct conditions** that are likely to produce head injuries

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## Ergonomics of the Workplace: Interacting Factors

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- **Personal** Age, Fitness, Body mass index (BMI), Fatigue, Health status, Physical training and exercise habits, Endurance, Dexterity, Strength, Flexibility
- **Circumstantial** Work organisation, Schedule, Floor layout, Equipment design, Communication within the team, Psychological support within the workplace, Hygiene protocols, Ambience, Architecture
- **Occupational** Physical workload, Working postures, Emotional strain, Cognitive burden

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## The Message

- **Knowledge** of ergonomics can prevent MSDs and improve task performance.
- Each extreme position is not itself dangerous, but **total cumulative load** over a day or career can cause MSDs
- **MSDs cause pain, functional deficit, lost working days, and lead to early retirement**

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# THANK YOU!!!

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