

**TO STUDY THE PREVALENCE OF MUSCULOSKELETAL PROBLEMS IN  
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**INTRODUCTION**

Anaesthesiology is defined by American Society of Anaesthesiologists as "the practice of medicine dedicated to the relief of pain and total care of surgical patients before, during, and after surgery."<sup>[1]</sup>

Anaesthesia covers a large spectrum of highly specialised disciplines: prehospital emergency medicine, per interventional consultation, regional anaesthesia, sedation, general anaesthesia, intensive and intermediate post-operative care and acute and chronic pain.<sup>[1]</sup>

An anaesthesiologist is a licensed medical doctor who specialises in patient care during peri operative period, emergency trauma care, intensive care unit management and pain management.

It is said that "anaesthesiologist is a physician to a surgeon and a surgeon to a physician."<sup>[1]</sup>

Work related musculoskeletal disorders, are a group of painful disorders of muscles, tendons, nerves and ligaments caused by overuse of musculoskeletal structures with repetitive and forceful activities.<sup>[2]</sup>

The association between musculoskeletal disorders and occupational factors was recognised at the beginning of the eighteenth century.<sup>[5]</sup> WRMDs are quite common in many occupations and the second largest cause of temporary work disability after the common cold.<sup>[6]</sup>

Prevalence of WRMDs is very high due to poor ergonomics and inadequate awareness of probable risk factors. Major obstacle is the physician's resistance to recognise their problems and accept their position as patients.

The nature of anaesthesiologist's work poses a potential extra risk from working in prolonged sustained static and adopting awkward postures with strong repetitive movements( long duration mask ventilation, intubation, resuscitation, frequent spinal flexion activities) and heavy lifting when handling equipments, they also use their upper extremity and neck muscles during airway management procedures.<sup>[3]</sup>

Performance of other key procedures such as spinal anaesthesia can also result in suboptimal ergonomics, one study demonstrating tense body postures, extreme degree of rotational movements of the spine and over-reaching for objects, all of which can have long-term physical consequences.<sup>[14]</sup>

According to the prevalence, the work related musculoskeletal disorders are- carpal tunnel syndrome, tendonitis, tenosynovitis, tension neck, impingement syndrome, rotator cuff tendonitis, bicipital tendonitis, de quervain's disease, shoulder capsulitis, medial and lateral epicondylitis, low back pain and knee pain, ankle and foot pain.<sup>[2]</sup>

The prevalence of neck pain- 59.3%, shoulder pain- 39.8%, knee and low back pain is 51.2% and 70.7% respectively.<sup>[3]</sup>

The contributing factors for the development of work related musculoskeletal disorders are- personal characteristics such as age, sex, body mass index, health status, exercise habits and occupational factors such as physical workload, working posture and their workplace ergonomics.<sup>[3]</sup>

This research will make recommendations for better understanding, prevention, early recognition, timely employment of disease altering therapies and streamlining the existing care.<sup>[4]</sup>

The aim of this study is to further study prevalence of musculoskeletal problems in anaesthesiologists.

**AIMS AND OBJECTIVES**

**Aim:** To study the prevalence of musculoskeletal problems in Anaesthesiologists.

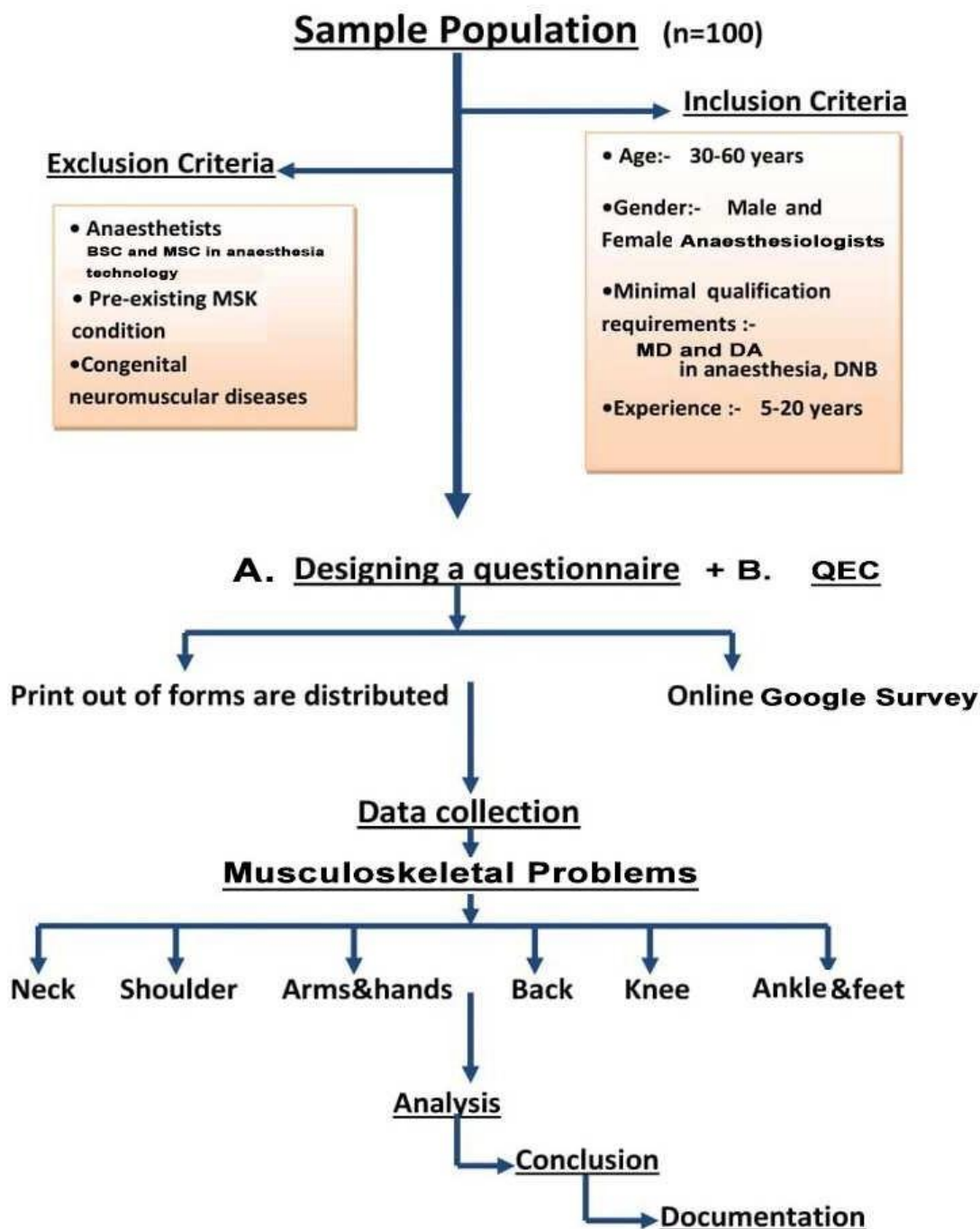
**OBJECTIVES**

- I. To identify the type of work related musculoskeletal disorders in anaesthesiologists.
- II. To find out which joint is mostly affected.

- III. To find out how prone are anaesthesiologists to work related musculoskeletal disorders.

**METHODOLOGY & PLAN OF STUDY**

The study group will be given thorough instructions prior to the distribution of survey based questionnaire. The recorded response will be collected and analysed.



1. **Study design:-** cross sectional survey
2. **Sample population:-** Anaesthesiologists
3. **Sample size:-** 30
4. **Duration of the study:-** 6 months
5. **Inclusion criteria**

- Age:- 30-60 years
- Gender:- male and female anaesthesiologists
- Minimal qualification requirements:- MD in anaesthesia,DNB
- Experience:- 5-20 years

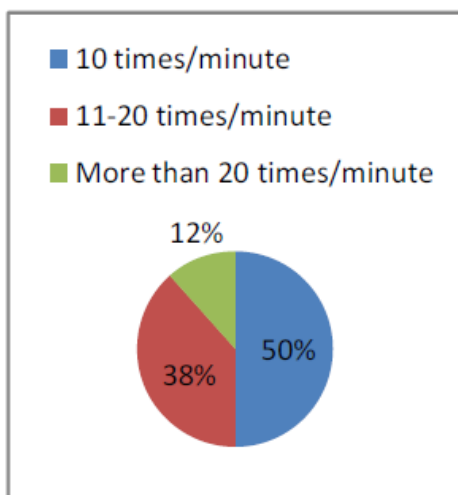
## 6. Exclusion criteria

- Anaesthetists
- Pre-existing MSK condition
- Congenital neuromuscular diseases

### Need of the study

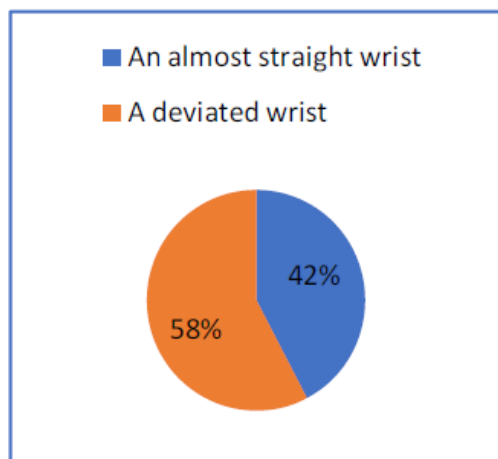
To identify work related musculoskeletal problems in order to take preventive steps by eliminating or reducing possible stress factors and there by planning a rehabilitation program.

This helps in ensuring physical and psychological well being of the anaesthesiologist and patient's safety and to educate them about proper posture for longer and pain free career Data Representation And Analysis:



**Graph 1: How many times are repetitive motion patterns performed at the wrist?**

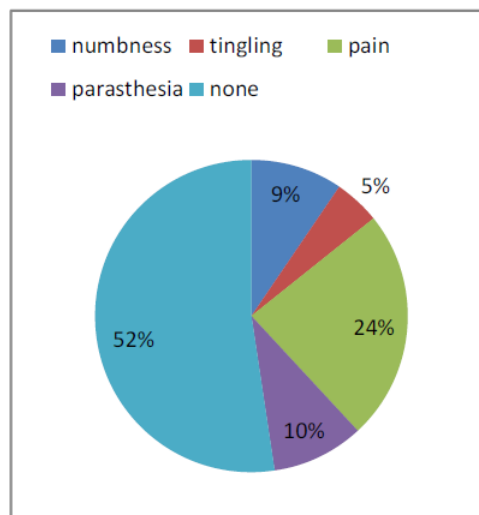
**INFERENCE:** Out of the total 27 respondents, 12% of the subjects perform repetitive motion pattern at wrist for more than 20 times per minute, 38% for 11-20 times per minute and 50% for around 10 times per minute.



**Graph 2: How are the procedures performed?**

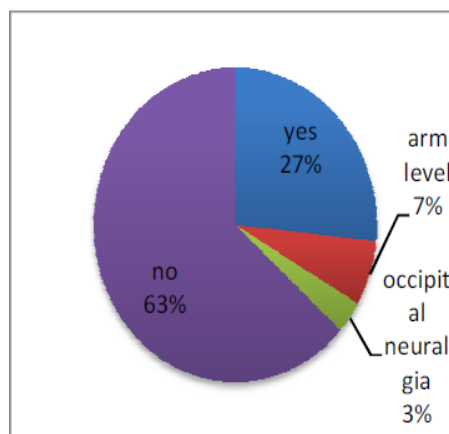
**INFERENCE:** The above pie chart shows that 42% of the total respondents perform the procedures with an

almost straight wrist, while 58% of the perform with a bent or deviated wrist.



**GRAPH 3: Have you experienced any of the following symptoms in your upper limb within a month?**

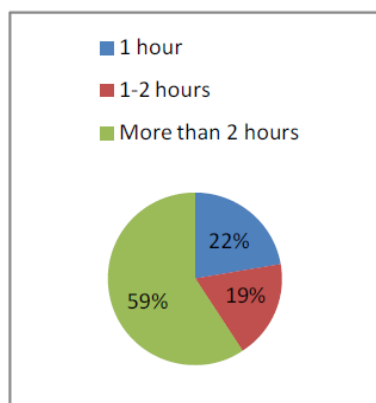
**INFERENCE:** The above pie chart denotes if the subjects have experienced any symptoms in their upper limb within a month, to which 52% of the subjects have not experienced any, 24% have pain in their upper limb, 10% have paraesthesia, 9% experience numbness in their upper limb and 5% experience tingling sensation.



**Graph 4: Are you currently experiencing any neck pain and if yes radiating to which level?**

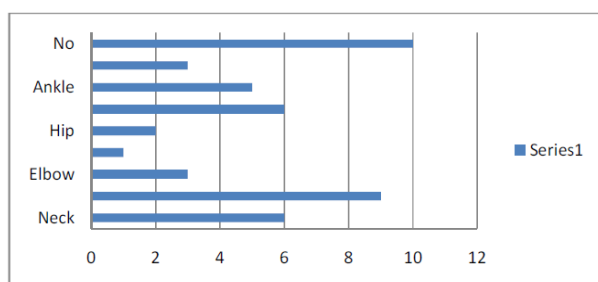
**INFERENCE:** The above pie chart shows that among the responses, 63% of the subjects are not experiencing any neck pain currently and 27% of subjects are.

Among the subjects that answered yes, it is radiating to the arm level for 7% of the subjects and 1% has occipital neuralgia.



**Graph 5: How long are you required to stand during the procedures?**

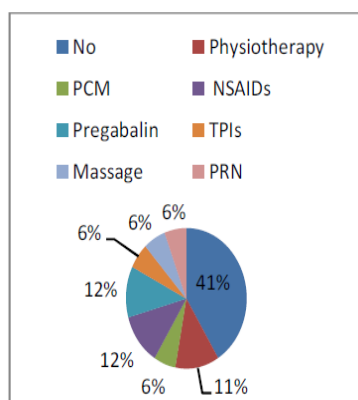
**INFERENCE:** The above pie chart shows that, 19% of anaesthesiologists were required to stand for 1-2 hours during the procedures, 22% for 1 hour and 59% were required to stand for more than 2 hours.



**Graph 6: Do you experience pain in any of the following?**

**INFERENCE:** The above bar graph shows that among the 27 responses, 10 respondents did not report any pain (22.22%), neck pain was reported by 6 (13.33%), shoulder pain by 9 subjects (20%), elbow pain by 3 (6.66%), wrist pain was reported only by 1 subject (2.22%), hip pain was reported by 2 (4.44%), knee pain was reported by 6 (13.33%) anaesthesiologists, ankle pain was reported by 5 (11.11%) subjects and back pain by 3 (6.66%) subjects.

Prevalence of pain from most common to least common: shoulder>neck>knee>ankle>back>elbow>hip>wrist



**Graph 7: Treatment taken for pain.**

**INFERENCE:** The above pie chart shows treatment taken for pain, out of the 17 respondents; 41% did not take any treatment, physiotherapy was taken by 11% of the subjects, massage and trigger point injection, massage by 6%, pregabalin by 12% and non steroidal anti-inflammatory drugs by 12%.

**RESULTS:** Demographics and work experience of the respondents.

**Table 1: Descriptive statistics. Values represent mean (SD), unless indicated otherwise.**

7), unless indicated other wise.				
Description	Male (Mean,Sd)		Female (Mean,Sd)	
	N=19		N=9	
Age	47.8 +/- 6.8		54 +/- 4.82	
Weight,(kg)	78.62 +/- 8.06		71.1 +/- 7	
Height (cm)	169.61 +/- 7.38		161.1 +/- 7.5	
BMI	27.3		27.4	
Dominance				
Right	18	(99%)	9	(100%)
Left	1	1%)	0	
Years of practice				
More than 15 years	12		8	
11-15 years	5		1	
10 years	1		0	

- Out of the total 27 subjects, 9 female and 18 male subjects; 96.2% of people were right handed and 3.8% were left hand dominant.
- 88.5% of subjects actively exercised and 11.5% occasionally did.
- 40% of the time, the back remains in a static position whereas; almost 60% of the time, the back does not remain in a static position while performing seated or standing tasks.
- Of the total responses, majority (92.3%) of the subjects work for 40-60 hours per week, 3.8% for less than 40 hours and 3.8% for more than 60 hours as well.
- 7.7% of doctors perform anaesthetic procedures less than 15 times and more than 50 times per week, 57.7% perform around 16-25 times per week and 26.9% for 26-50 times per week.
- 42.3% of the anaesthesiologists have to perform a night shift around 1-4 times per month, 23.1% for more than 5 times and 34.6% do not have to perform any night shift.
- Majority of the subjects did not experience any neck pain, and 25% incidence noted to be radiating to the arm level.
- The most affected joint by pain was shoulder followed by neck and knee joint.
- Many of the subjects have not taken any treatment for their symptoms but for those of which who did the treatment included; physiotherapy, trigger point injections, anti-inflammatory drugs, pregabalin painkillers and massage.

## DISCUSSION

The increasing prevalence of work related musculoskeletal disorders among at risk physicians has been called 'an impending epidemic' and 'the tip of the ice berg'.

Similarly, this cross sectional study shows that anesthesiologists carry high risks for musculoskeletal disorders.

Almost a third of the respondents have work experience of more than 15 years (73%) and (23%) have experience of 11-15 years.

As 57.7% respondents perform anaesthetic procedures around 16-25 times per week and majority (92.3%) of the subjects work for 40-60 hours per week and 69% of them do not get enough resting time in between the procedure; these prolonged working hours with inadequate rest breaks or working night shifts overtime leads to fatigue and reduced muscle recovery.

A fatigued anesthesiologist may not be vigilant while monitoring patients, which may lead to misinterpreting parameters and making errors in medical judgment. The Association of Anesthetists of Great Britain & Ireland recommended regular rest breaks and exercise to avoid fatigue.<sup>[7]</sup>

The most prevalent problem was shoulder pain followed by neck and knee pain and ankle pain which could be as all anaesthesia procedures need use of neck movements. If these movements are done with poor ergonomics or lifting heavy instruments may cause muscle strain. Most of the movements involve shoulder girdle movements and long standing hours during the procedures could be the reason.

A US review of epidemiological evidence for work-related musculoskeletal disorders concluded that there was strong evidence for a causal relationship between posture and neck or neck/shoulder disorders.<sup>[15]</sup>

Bending for extended periods of time during procedures may be the reason for symptoms of back pain.

Maintaining a balanced or neutral body posture is the first essential ergonomic principle in avoiding ergonomic problems. Sustaining awkward postures for the wrist, elbow, shoulder, neck, and low back puts more stress on the musculoskeletal system, and static load, which means working for long periods in a static position, causes the body to fatigue.

In our study, we analysed the prevalence of awkward postures of anaesthesiologists and we confirmed that bending for long periods was the most significant predictor for WRMDs in the neck, and back. Similarly, having the head in a low position for extended periods increased the risk of elbow disorders.

The mechanisms of WRMDs are defined as multifactorial and described with composite models and therefore, it is difficult to evaluate work related MSD pain is the inability to understand the individual factors related to sex and comorbidities, job design, workplace environment (psychosocial as well as physical), overwork, fatigue, and stress levels of employees are important factors attributed to the development of WRMDs.<sup>[8]</sup> One difficulty in evaluating work related MSD pain is the inability to decide whether the pain is work related or age related or general health related or a combination of all these factors. Future studies should aim at better understanding of musculoskeletal pain to derive proper recommendations to minimise and treat the pain. Even with the limited knowledge of MSD, the following can be recommended to prevent and minimise work related MSD pain.<sup>[9]</sup> We can encourage the subjects to engage in adequate physical activity for fitness, to maintain ideal body weight.

Proper ergonomics are recommended, planning a break in between patients and avoiding of smoking and alcohol consumption, if any.

Several adaptations have contributed to maintaining a neutral posture, such as monitor view instead of direct visualisation, optimal monitor positioning for the physician, and redesigned instruments.<sup>[10,11]</sup> There is growing recognition of the role of ergonomic design for equipment (tables, monitors, lighting, cables, and instruments) in the operating room for surgeons and anesthesiologists.<sup>[10,11,12,13]</sup>

Thus, maximum muscle performance with minimum load could be achieved Clinical Implications

- This study will help a physiotherapist in planning a treatment plan for anaesthesiologists by taking into consideration the frequency of procedures.

An ICF is prepared taking patient's facilitators and barriers into consideration, which include their strengths and weaknesses in a hospital bound environment.

According to the discussion and data collected, body posture observed heavily contributes to an increase in the risk of injury faced by an anaesthesiologist.

Hence, training and education by a physiotherapist regarding posture and methods of work practice by examining his/her strength and manual muscle testing can help reduce the prevalence of WRMDs and prevention of pain generating trigger points in anaesthesiologists making it a prospective study.

- This study will help in planning the ergonomics, table height during laryngoscopy, etc which was the causative factor of significant pain.

Redesigning instruments can change from subject to subject. This can be used as a base for conducting



another study for theoretical purpose; to study and assess a particular joint affected and prevalence of injury in that specific joint among anaesthesiologists.

- The physiotherapist can help teach the participants mobilisation, stretching out, strengthening exercises, which are found to decrease reported experiences of MSDs pain

### Recommendation

To reduce the occurrence of WRMD's in anaesthesiologists the following things could be done:

#### 1. Awareness about the occurrence of WRMDs

- It is necessary to educate the anaesthesiologists right from the start about the occurrence and preventive measures that can be undertaken to reduce their incidence, as a major obstacle is the physician's resistance to recognize their problems and accept their position as patients.

#### 2. Postural Re-education

- The working posture of anaesthesiologists should be

assessed and corrected.

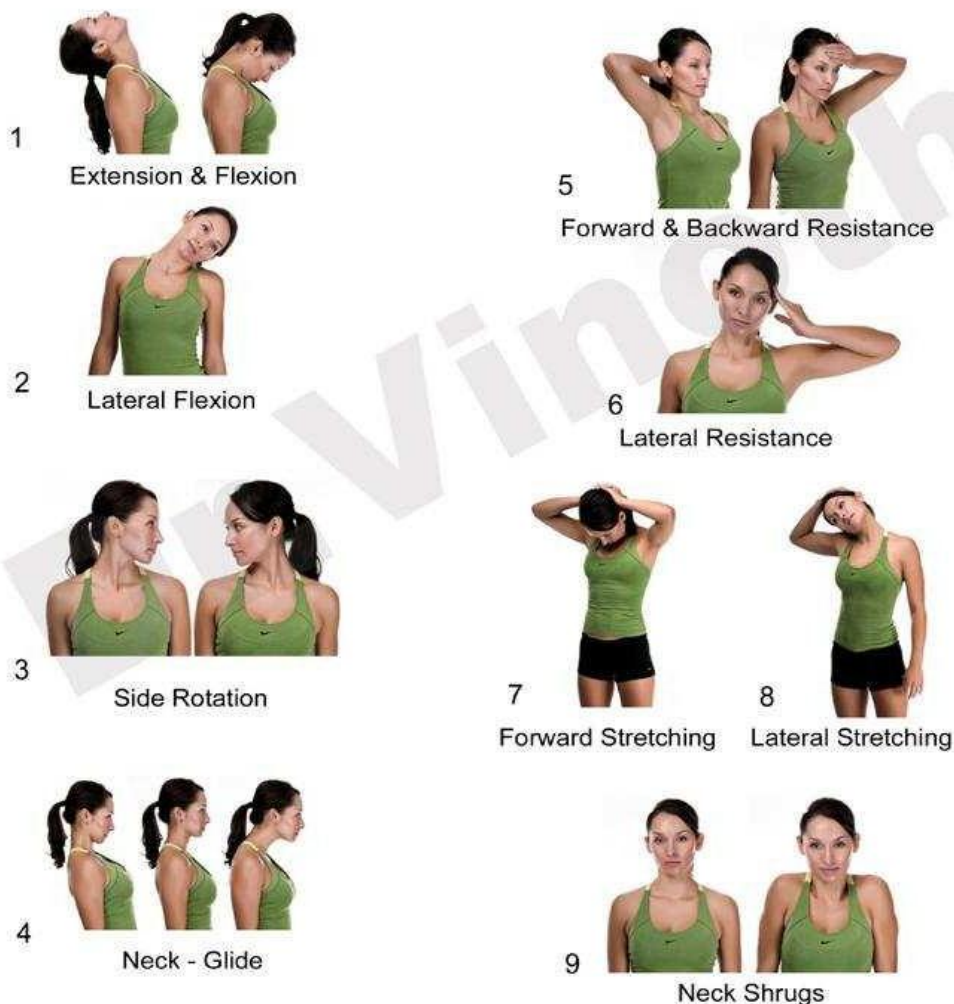
- To maintain a neutral posture, such as using monitor view instead of direct visualisation, optimal monitor positioning for the anaesthesiologist.

#### 3. Self stretching techniques

- Self stretching techniques of the cervical, shoulder, lower back and lower extremity muscles can be taught to the anaesthesiologists by demonstration or showing them videos online. This way they can do the stretching on their own without assistance and release the tension off muscles during long procedures.
- Warm up, cool down and other mobility exercises can also be taught for relaxation purposes along with taking micro breaks in between two procedures.

Following are some easy stretches that can be suggested for commonly affected muscles:

### NECK EXERCISES

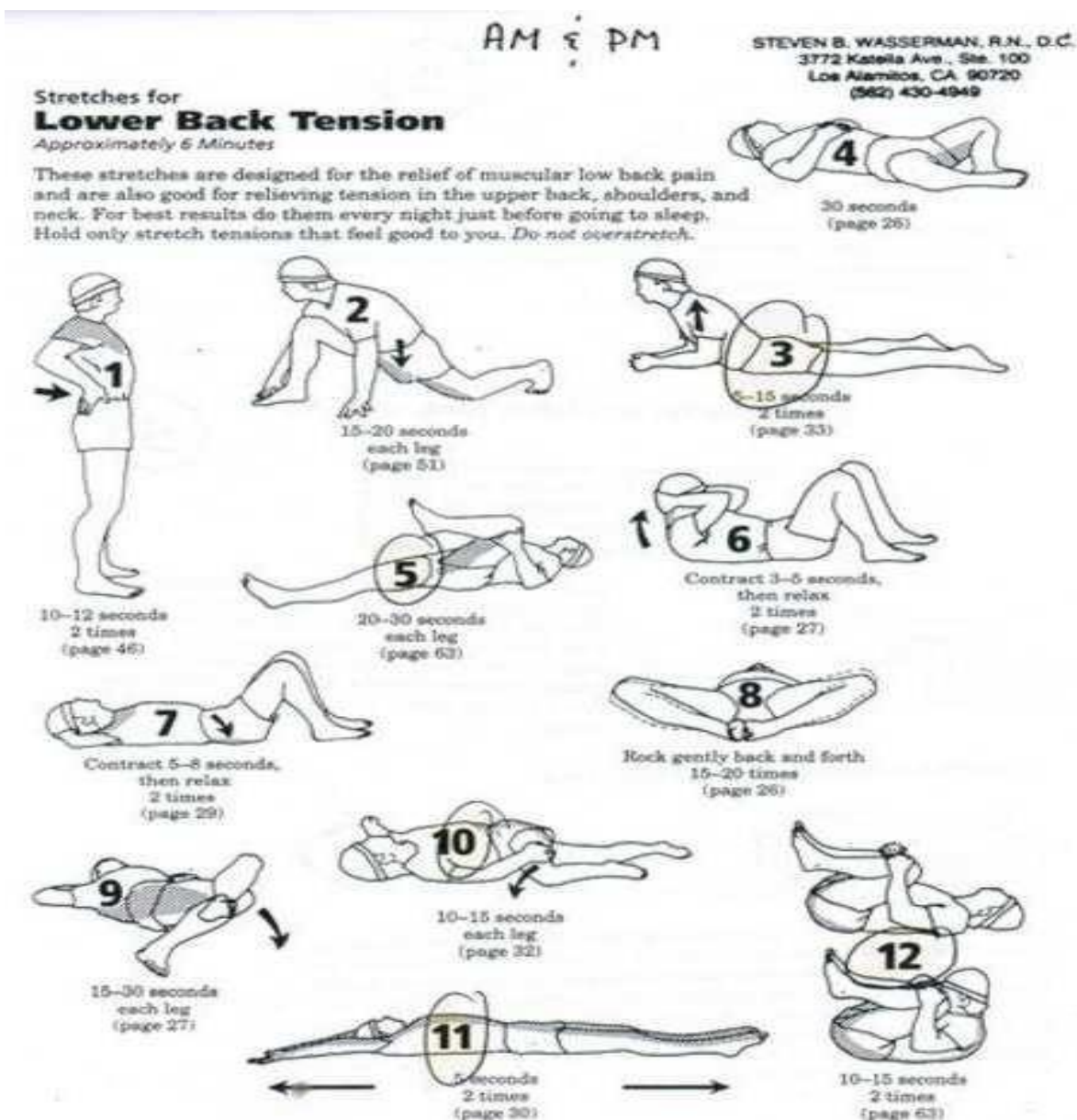


## Stretches for the Hands, Arms & Shoulders

Approximately 4 Minutes

This series of stretches works for repetitive stress problems in the hands and arms. Breathe naturally, stay comfortable, and be relaxed as you stretch.





## CONCLUSION

The study results confirmed our hypothesis that some demographics, workload characteristics, influenced WRMDs in anesthesiologists. We hope that our study will pave the way for further studies to identify how ergonomics can be improved and change the physical environment in the operating room, and raise awareness of body positioning for anesthesiologists.

Ergonomic analysis is required to investigate how improvement in the design of workstations and equipment could improve or even prevent and education/training is needed to improve poor posture and work practices to reduce the risk of injury.

## Limitations of the study

1. Contributing factors other than work conditions could not be reviewed.
2. Could not assess the posture while working.

3. The sample size of the respondents is less.

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