

Surgical Ergonomics in General & Breast Surgery: A Snapshot Study

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Introduction

Work-related musculoskeletal (MSK) disorders are increasingly prevalent among surgeons, with associated career modification. Formal education on surgical ergonomics and subjective assessments of the surgeons posture remain sparse.

We aim to objectively assess the surgeons' posture intra-operatively, using the Rapid Entire Body Assessment (REBA) toolkit and identify potential risk factors leading to acquired MSK disorders.

Methods

- Voluntary questionnaires distributed among surgeon to obtain baseline demographics
- Data collected prospectively between December 2023 – January 2024, using REBA toolkit
- Basic statistical analysis performed in Microsoft Excel

Musculoskeletal Discomfort Form (Based on the Nordic Questionnaire (Kuorinka et al. 1987))

How to answer the questionnaire:
Picture: In this picture you can see the approximate position of the parts of the body referred to in the table. Limits are not sharply defined, and certain parts overlap. You should decide for yourself in which part you have or have had your trouble (if any).

Table: Please answer by putting an "X" in the appropriate box - one "X" for each question. You may be in doubt as to how to answer, but please do your best anyway. Note that column 1 of the questionnaire is to be answered even if you have never had trouble in any part of your body; columns 2 and 3 are to be answered if you answered yes in column 1.

To be answered by everyone

Have you at any time during the last 12 months had trouble (ache, pain, discomfort, numbness) in:

Neck	Shoulders	Elbows	Wrists/Hands	Upper Back	Lower Back (small of back)	One or Both Hips/Thighs	One or Both Knees	One or Both Ankles/Feet
<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes, right shoulder <input type="checkbox"/> Yes, left shoulder <input type="checkbox"/> Yes, both shoulders	<input type="checkbox"/> No <input type="checkbox"/> Yes, right elbow <input type="checkbox"/> Yes, left elbow <input type="checkbox"/> Yes, both elbows	<input type="checkbox"/> No <input type="checkbox"/> Yes, right wrist/hand <input type="checkbox"/> Yes, left wrist/hand <input type="checkbox"/> Yes, both wrists/hands	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes

To be answered by those who have had trouble

Have you at any time during the last 12 months been prevented from doing your normal work (at home or away from home) because of the trouble?

Neck	Shoulders	Elbows	Wrists/Hands	Upper Back	Lower Back (small of back)	One or Both Hips/Thighs	One or Both Knees	One or Both Ankles/Feet
<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes

Have you had trouble at any time during the last 7 days?

Neck	Shoulders	Elbows	Wrists/Hands	Upper Back	Lower Back (small of back)	One or Both Hips/Thighs	One or Both Knees	One or Both Ankles/Feet
<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes

ERGONOMICS REBA Employee Assessment Worksheet

A. Neck, Trunk and Leg Analysis

Step 1: Locate Neck Position

Step 2: Locate Trunk Position

Step 3: Locate Leg Position

B. Arm and Wrist Analysis

Step 4: Locate Upper Arm Position

Step 5: Locate Lower Arm Position

Step 6: Locate Wrist Position

Step 7: Adjust

Step 8: Add Neck Score to Table A

Step 9: Add Trunk Score to Table A

Step 10: Add Leg Score to Table A

Step 11: Add Upper Arm Score to Table A

Step 12: Add Lower Arm Score to Table A

Step 13: Add Wrist Score to Table A

Step 14: Add Total Score to Table A

Step 15: Add Final Score to Table A

Step 16: Add Final Score to Table A

Step 17: Add Final Score to Table A

Step 18: Add Final Score to Table A

Step 19: Add Final Score to Table A

Step 20: Add Final Score to Table A

Step 21: Add Final Score to Table A

Step 22: Add Final Score to Table A

Step 23: Add Final Score to Table A

Step 24: Add Final Score to Table A

Step 25: Add Final Score to Table A

Step 26: Add Final Score to Table A

Step 27: Add Final Score to Table A

Step 28: Add Final Score to Table A

Step 29: Add Final Score to Table A

Step 30: Add Final Score to Table A

Step 31: Add Final Score to Table A

Step 32: Add Final Score to Table A

Step 33: Add Final Score to Table A

Step 34: Add Final Score to Table A

Step 35: Add Final Score to Table A

Step 36: Add Final Score to Table A

Step 37: Add Final Score to Table A

Step 38: Add Final Score to Table A

Step 39: Add Final Score to Table A

Step 40: Add Final Score to Table A

Step 41: Add Final Score to Table A

Step 42: Add Final Score to Table A

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Step 86: Add Final Score to Table A

Step 87: Add Final Score to Table A

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Step 89: Add Final Score to Table A

Step 90: Add Final Score to Table A

Step 91: Add Final Score to Table A

Step 92: Add Final Score to Table A

Step 93: Add Final Score to Table A

Step 94: Add Final Score to Table A

Step 95: Add Final Score to Table A

Step 96: Add Final Score to Table A

Step 97: Add Final Score to Table A

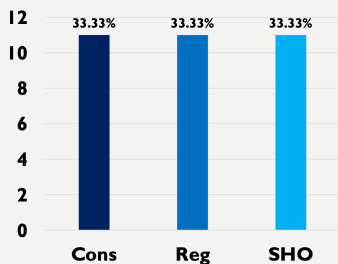
Step 98: Add Final Score to Table A

Step 99: Add Final Score to Table A

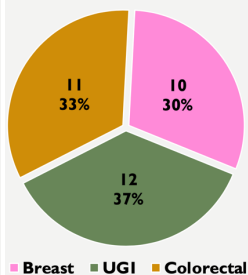
Step 100: Add Final Score to Table A

Results

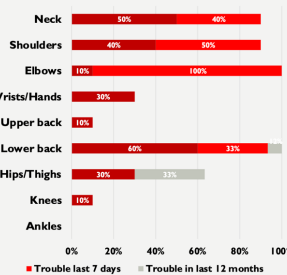
Grade



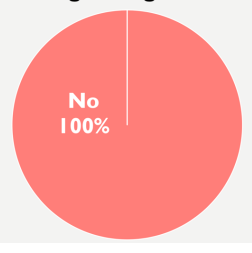
Subspecialty



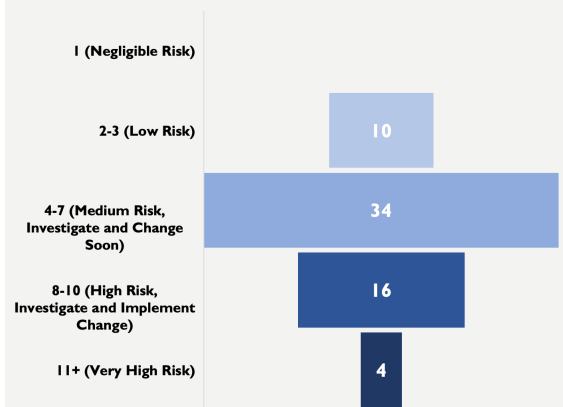
Anatomical Distribution of MSK Issues



Formal training/education on surgical ergonomics?



Overall REBA Assessment Scores



Risk Factors	Relative Risk (95% CI)	p-value
Open Surgery	5 (1.648 – 15.175)	0.004
Pre-Existing MSK Issue	1.56 (0.532 – 4.573)	0.452
Primary Surgeon	2.05 (0.668 – 6.345)	0.210
Assistant Surgeon	0.49 (0.158 – 1.497)	1.27
Height difference > 10cm	0.46 (0.084 – 2.55)	1.37

Conclusion

Open surgery appears to be a statistically significant risk factor for poor surgical ergonomics. There remains an important need for formal education on surgical ergonomics, surgeons are actively encouraged to perform regular stretches in between cases and ask for assistance from colleagues for height adjustments as necessary. We aim to reassess for progression once an educational intervention is completed.