SURGEONS SKILLS IN MEASURES EVALUATION[1]

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ABSTRACT - Background: Surgeons commonly estimate dimensions without the help of measuring instruments, a practice with importance to the right therapeutic choice, scientific purposes and legal matters. **Methods**: 40 senior surgeons were asked to estimate measures of lines in cards (visual evaluation) and to draw lines with a chosen measure (motor evaluation). **Results**: Visual evaluation is overestimated, and motor evaluation is underestimated. **Conclusion**: Measures evaluation without the help of instruments is prone to error.

KEY WORDS – Measurements. Metric system. Evaluation.

INTRODUCTION

It is a common practice among surgeons, specially in the operating room, to estimate dimensions without the help of measuring instruments. The knowledge of a measure as correct as possible and your inclusion in medical records has a strong importance to the right therapeutic choice, scientific purposes and even legal matters.

This paper has the intention to analyze the ability of surgeons to estimate correctly the metric measures and alert to the possibility of error when instruments are not used to help in the measurement.

METHODS

Forty senior surgeons (37 males, 3 females, mean age 41.2 ± 9.6, range 28 - 59 years), whose specialties are listed in Table I, were participants of the trial. They were always interviewed in the operating room, just before scrubbing, i. e., in the same enviromental conditions they will be submitted in the operation (glasses, luminosity, etc).

TABLE 1 - Surgeons characteristics and specialties.

Specialties	Number
ENT	1
Thoracic surgery	1
Vascular surgery	1
Urology	2
Head and neck	3
Pediatric surgery	3
Orthopedics	3
Heart surgery	4
Plastic surgery	4
Neurosurgery	4
Gynecology/obstetrics	4
General surgery	5
Trauma Surgery	5

In the first part of the experiment (experiment I – Figure 1), four numbers between 1 and 15 were randomically chosen, namely: 1, 5, 8 and 13. The participant surgeons received a white sheet of paper measuring 25 x 13 centimeters and they were asked to draw lines measuring in centimeters the numbers chosen. They were not aware of the following number until the previous line was drawn. When asked, the use of fingers as a parameter was allowed.

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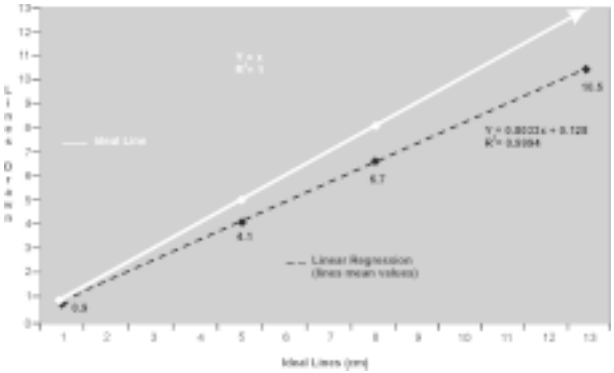

FIGURE 1 - Linear regression of the lines drawn (experiment I).

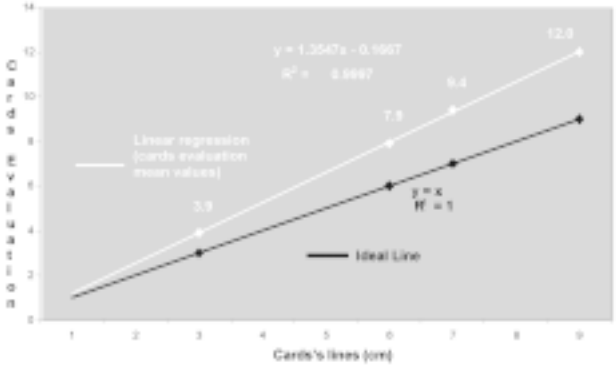

FIGURE 2 - Linear regression of the cards evaluation (experiment II).

In the second part of the experiment (experiment II – Figure 2), enrolled surgeons were shown four white cards measuring 15 x 6 centimeters where lines were drawn measuring again four randomically chosen numbers between 1 and 15, namely: 6, 3, 7 and 9. Surgeons were then asked to identify the dimension of the line, in centimeters. Cards were presented in the same order as the numbers were chosen and they were not seen simultaneously. Once more, when asked, the use of fingers as a parameter was allowed.

Statistical tests used were confidence interval and linear regression.

RESULTS

Results concerning experiment I are disposed in table II. Data show that participant surgeons drew lines smaller than asked (99% confidence interval), excluding 1 centimeter line. The difference between drawn line and theoretical value increases progressively with higher values.

TABLE 2 - Lines drawn by the surgeons (experiment I).

Number chosen	Lines dimensions in centimeters (cm) (mean ± SD)	Range	Lines surpassing the number chosen	Lines smaller than the number chosen	Confidence interval 99%
1	0.9 ± 0.2	0.5-1.4	12 (30.0%)	26 (65%)	0.8 - 1.0
5	4.1 ± 1.1	2.4-7.7	6 (15.0%)	33 (82.5%)	3.6 - 4.6
8	6.7 ± 1.6	3.7-12.3	6 (15.0%)	32 (80.0%)	6.0 - 7.4
13	10.5 ± 2.4	6.3-17.4	3 (7.5%)	33 (82.5%)	9.4 - 11.6

SD = standard deviation

Results concerning experiment II are disposed in table III. Data show that estimation of cards measures is overestimated (99% confidence interval). The difference between theoretical value and estimated value increases progressively with higher numbers.

TABLE 3 - Evaluation of lines in the cards (experiment II).

Line in the card (cm)	Dimension evaluated in centimeters (mean ± SD)	Range (cm)	Mode	Correct values	Values surpassing the number	Values smaller than the number	Confidence interval (99%)
6	7.9 ± 2.4	5-14	6	9 (22.5%)	26 (65.0%)	5 (12.5%)	6.9 - 8.9
3	3.9 ± 1.7	1-8	3	13 (32.5%)	21 (52.5%)	6 (15.0%)	3.2 - 4.6
7	9.4 ± 2.7	5-16	8	6 (15.0%)	32 (80.0%)	2 (5.0%)	8.2 - 10.6
9	12.0 ± 3.4	8-20	10	4 (10.0%)	33 (82.5%)	3 (7.5%)	10.5 - 13.5

SD = standard deviation

DISCUSSION

We could not find similar experiments in the literature to compare our results. However, we think we were able to show the imprecision of the evaluation of measures without the use of instruments.

Based on our results we noticed that motor evaluation (like the size of a skin incision or an esophageal myotomy, e. g.) is underestimated and visual evaluation (like estimating the size of a tumor or a safety margin, e. g.) is overestimated. We believe it is not necessary to repeat the importance of a correct measurement. A sterile ruler should always be available, or inexpensive acts like gauging every-day-use instruments like forceps must be done.

CONCLUSION

Measures evaluation without the help of instruments is prone to error.

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RESUMO – Introdução: Cirurgiões comumente estimam dimensões sem a ajuda de instrumentos adequados, prática com implicâncias na terapêutica, trabalhos científicos e de ordem legal. **Métodos:** No estudo apresentado foi solicitado a 40 cirurgiões estimar as medidas de linhas traçadas em cartões (avaliação visual) e traçar linhas com medidas pré-determinadas (avaliação motora). **Resultados**: Mostraram que a avaliação visual é superestimada e a motora subestimada. **Conclusão:** A avaliação de medidas sem instrumental adequado é sujeita a erro.

DESCRITORES – Medições. Sistema métrico. Avaliação.

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