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LETTER TO EDITOR

Evidence-bases Economy in Medical Diagnosis; a Letter To Editor

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After history taking, physical examination, and making a list of clinical diagnosis, laboratory tests and imaging are necessary for ruling out differential diagnosis, which is a multifaceted scientific, economic, and ethical decision. In this article, we focus on the economic sector and introduce a new, evidence-based method for this purpose.

Evidence-based process (biostatistical, biomathematical) is used for planning and solving medical problems such as ruling in or ruling out a disease using paraclinical tests.

Sometimes a doctor has to use two or more tests to diagnose the disease, which, if requested simultaneously and independently, is called a "parallel strategy"(1), which is completely uneconomical except in emergencies. However, the doctor may first requests test A with Sensitivity A, Specificity A, Cost A (table 1) and if the answer is negative, request test B with Sensitivity B, Specificity B, Cost B (table 2) this is called the " Serial Or" strategy (1) which is the subject of this article.

Now, for summing the cost of the required tests we can write:

Relation 1: Cost of test A= TA (p+q)

Relation 2: Cost of test B= TB[p(1-se_A)"+qsp_A]

Relation 3: Total cost = TA(p + q) + TB[p(1-se_A)+qsp_A]

The following questions should be asked:

If the two tests are switched, A before B (A>B) or B before A (B>A), does it change the final outcome?

Should we pay attention to the sensitivity (se) or specificity (sp) of the tests or to their costs, or both?

In answer to the first question, it should be said that the delay in selecting the tests has no effect on the final result and this can be easily and mathematically proven. (2) Regarding the second question and by referring to relation 3, we can conclude that the most important factor is the cost of the test. This means that the first point for choosing the test should be the cost then other characteristics of the test. Also, the higher the Sensitivity A and Specificity A the higher the cost effectiveness. In other words, a test should be chosen as the first choice that is cheaper with higher sensitivity and specificity.

Table 1: Disease probability when ordering Test A first

Disease probability	Test A (+)	Test A (-)
P	pse_A	P(1-Se_A)
q	q(1-SP_A)	qsp_A
p + q	pse_A+q(1-SP_A)	P(1-Se_A)+qsp_A

Table 2: Disease probability when ordering Test A first and the result is negative then ordering Test B "serial or"

Disease probability	Test B (+)	Test B (-)
p(1-se_A)	p(1-se_A) se_B	p(1-se_A)(1-se_B)
qsp_A	qsp_A(1-se_B)	sp_Asp_B
p(1-se_A)+qsp_A	p(1-se_A)se_B+ qsp_Ap(1-se_B)	p(1-se_A)(1-se_B)+ qsp_Asp_B

Some readers may think that this result is obvious, but this is not the case. With a little research, it becomes clear that many physicians prefer the characteristics of the tests to their price. (3)

Health economy is one of the branches of economy. Since the costs of diagnosis and treatment are increasing, this issue is becoming more and more important and the reasons for this increase can be summarized as follows: the introduction of new tests as well as the high cost of newer tests due to its complexity as well as the fact that doctors today rely more on paraclinics instead of clinics and finally that doctors request multiple parallel tests at the same time to facilitate their work, which is completely uneconomical.

1. Conclusion

In this letter, we have tried to show with the evidence-based model that physicians should use the "Serial or" strategy and the cheapest test for diagnosis. Other methods are not eco-

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nomical and should not be requested except in emergency or special cases.

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