Risk communication: bias in decision making?

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Introduction

To correctly interpret health information, basic statistical literacy is required, so that the benefits and risks can be properly sized and an informed decision can take place. Transmission of information by using some statistics, such as the relative risk reducing without the base rate, often occurs in medical journals, newsletters, pamphlets and websites [1].
All medical procedures involve risks, and to offer the best health care, physicians and patients must know the correct magnitude of the risks and benefits. Typically, relative risks are large numbers in opposition to absolute risks that translate by small numbers. The relative risk values are frequently used to transmit health information without specifying the base rate, or the absolute risk values are not reported, which usually lead to an overestimation of the benefits and a downplay of the risks [1].
In this work, one intends to verify if health professionals and patients in general, correctly understand the meaning of the relative risk reduction (RRR), absolute risk reduction (ARR) and the number needed to treat (NNT).

Methods

In a survey in New Zealand, people received information about the benefits of three painless, simple, fast, and cost-free screening tests for cancer [2], and were asked to rate each test according to their willingness to perform it, on a scale of 1 to 5 Likert points. Actually, the three tests could be the same, only the reported benefits were transmitted differently.
The data collection for this study was carried out through an online questionnaire with these same tests, but including an additional answer option, “I do not have enough data”:
Test 1. If you do this test every two years, your chance of dying from this cancer is reduced by about a third over the next 10 years.
Test 2. If you do this test every two years, your chance of dying from this cancer is reduced by about three in a thousand to about two in a thousand in the next 10 years.
Test 3. If about 1000 people perform this test every two years, a person will be saved from dying from this cancer in the next 10 years.
The questionnaire was available since January 2, 2019. The present data is the one obtained by February 20, 2019. The respondents were divided in health professionals (physicians and nurses), general population and medical students.

Results

There were 339 answers, of which 113 (33.3%) were from physicians, 93 (27.4%) from nurses, 6 (1.8%) from medical students in the fifth or sixth year and 127 (37.5%) from the general population.

To analyze each test individually, the levels one and two and four and five, where grouped in “I do not want to perform the test” and “I want to perform the test” respectively. For the general population (Figure 1), 73.9% said they wanted to perform the test when the benefits were presented in terms of RRR (test 1), lowering this value to 55.0% for the presentation by the ARR (test 2) and to 43.2% for the NNT (test 3). These differences were statistical significant ($p < 0.001$). About 6.7% in test 1, 19.2% in test 2 and 22.0% in test 3 had an indifferent opinion (point 3 on the Likert scale), which may point to a greater self-perception of what RRR means, followed by ARR and then NNT. About 13.6% said that, for test 3, they had not enough data. When comparing to the other two tests (9.2% for test 1 and 7.5% for test 2), this highlights the possible lower understanding of the NNT.

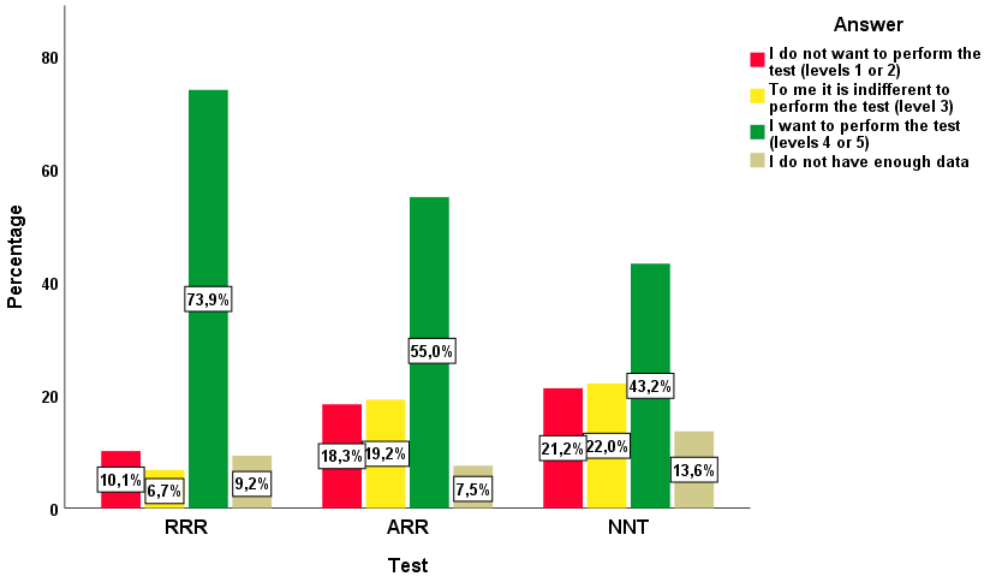

Figure 1. Answers given by the general population.

For health professionals (Figure 2), 79.5%, said they wanted to perform test 1, lowering this value to 57.6% for test 2, and to 45.7% for test 3 ($p < 0.001$). These percentages were slightly higher than the ones obtained for the general population. Also, for test 1, it was also higher the percentage who said that they had not enough data (13.0% versus 9.2% in the general population). Does this mean that more health professionals know that the base rate is missing in RRR?

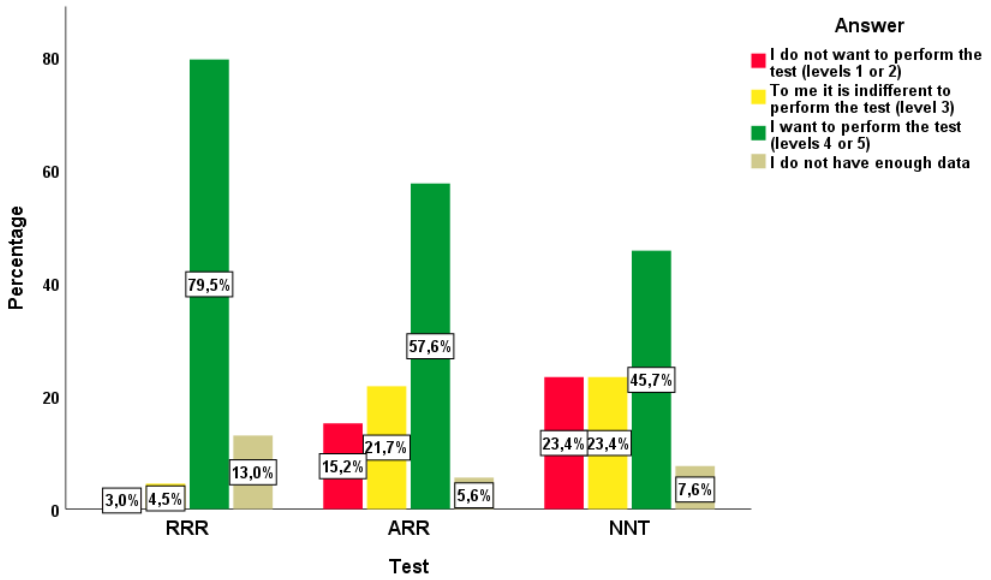

Figure 2. Answers given by health professionals.

Analyzing the answers for the three tests simultaneously (Figure 3), those who understand the three concepts, will give the answer "I have not enough data" to test 1 and the same answer to the other two tests (“correct” answers). Nevertheless, others will identify the tests as being the same, and will give the same answer to the three tests ("almost correct" answers). The other answers show that at least one of the measures is not understood ("incorrect" answers).

The rate of correct answers was 7.6% in the general population and 10.2% in health professionals, but the rate of incorrect answers was 60.2% in the general population and 62.4% in health professionals. No medical student gave the correct answer and 2 gave the almost correct one.

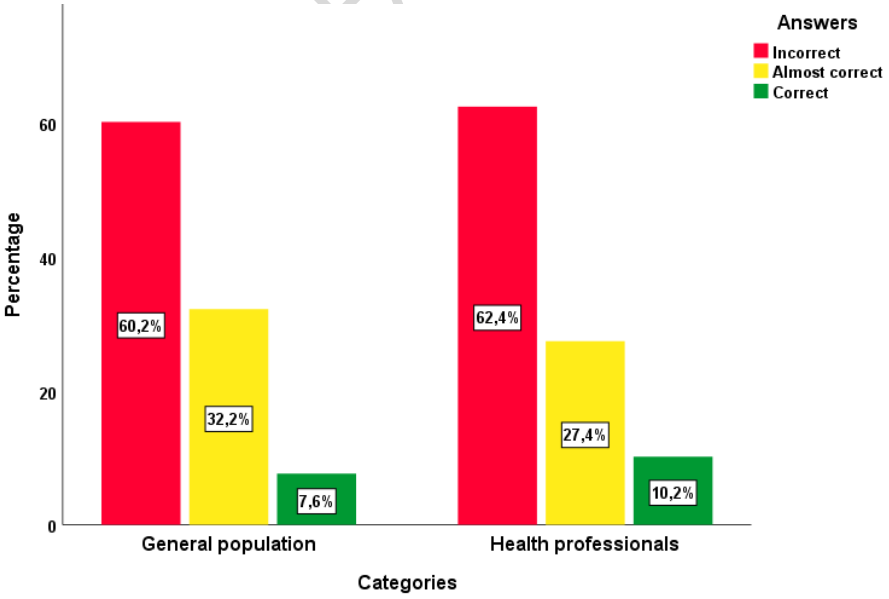

Figure 3. Answers for the three tests simultaneously.

Excluding the answer "I do not have enough data", about 37.5% overestimated the benefits of the RRR, compared to ARR and NNT in general population, increasing this percentage to 45.1% in health professionals. The overestimation of the ARR was 3.1%

in general population and 3.0% in health professionals and the NNT was 8.3% and 2.4% respectively (Figure 4).

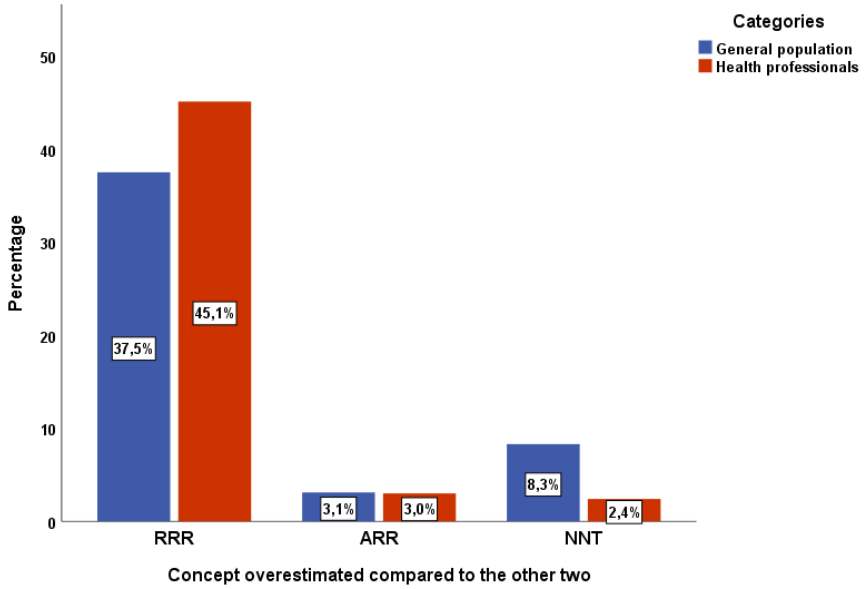

Figure 4. Overestimation for each concept.

Discussion and conclusions

The results point to RRR being the measure with the greater impact on decision. The NNT is the one that has the less impact and possibly also less understood. The overestimation of RRR is more pronounced in health professionals than in general population. This outcome was not expected, and may be the consequence of the pressure of medical propaganda, together with a lack of basic health statistical literacy. Despite the very small sample of medical students, their statistical knowledge was poor. These results point to the need of the reinforcement of the statistical education among health professionals and medical students.

Bibliography

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