

Conflict of "Normal Range"

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Introduction / Summary

Blood and lab test results often include numerical values that represent levels of substances in the body. These values are only meaningful when compared to reference (or "normal") ranges, which indicate what's expected in a healthy individual. These ranges are established by testing samples from healthy people—typically at least 120 individuals—and excluding the top and bottom 2.5% to define the 95% "normal" range. Factors like age, sex, and geographic location affect these ranges. There are two types of tests: Qualitative (e.g., yes/no results like pregnancy tests) and quantitative (numerical results like iron levels or white blood cell count). When undergoing testing, even if a patient is to fall outside of the general reference range this is not a firm indicator that they have anything wrong.

Many people interpret lab results solely based on whether their values fall within the reference range, often overlooking that being inside the range doesn't guarantee good health, and being outside doesn't always mean something is wrong. This study aims to explore how often such misinterpretations occur and why they matter, especially as more people use independent testing services without medical guidance.

The study also seeks to fill a gap in existing research by focusing on how well people understand reference ranges, particularly when they receive "abnormal" results but feel healthy. Unlike previous studies that simply recommend more testing when results fall outside the range, this research emphasizes the importance of considering outliers as a standard part of interpretation.

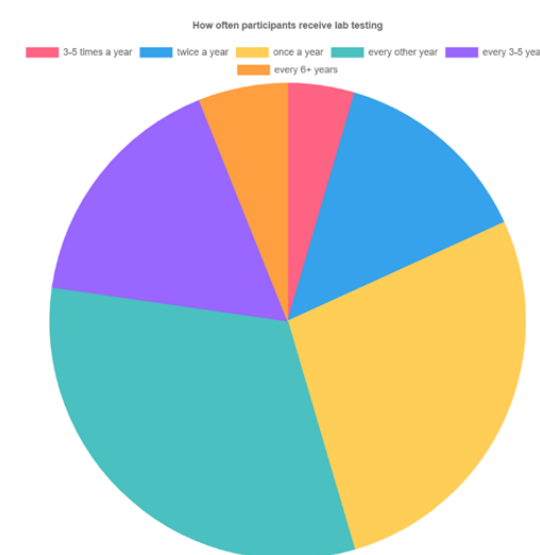
It will also examine how often people acknowledge these nuances when reviewing their results and aims to promote better education around lab test interpretation. The core hypothesis is that "Due to a lack of education, there is a large amount of misunderstanding on the meaning behind medical testing results."

Methodology

This study is conducted based on a survey with a general questionnaire on people's behavior as well as giving a hypothetical medical situation with a patient demonstrating out-of-range lab results. The survey was anonymous in order for people to feel more comfortable answering medical-focused questions without exposure of identity. The survey includes 3 personal questions regarding participants' behavior regarding their own lab testing and a two-part question based on a hypothetical clinical situation which the participants had to analyze. The situation was as follows:

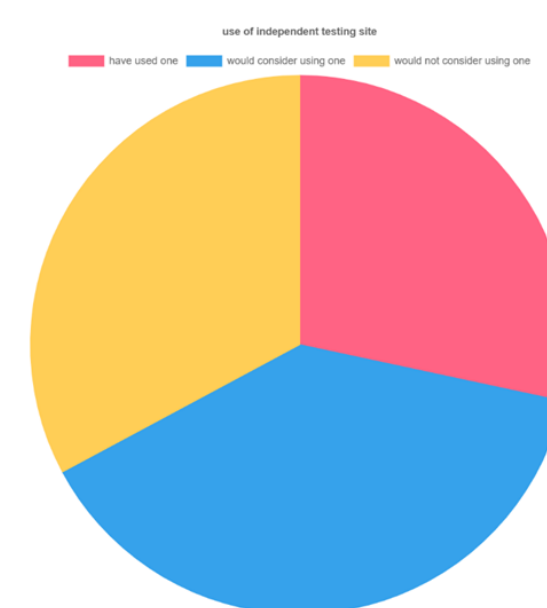
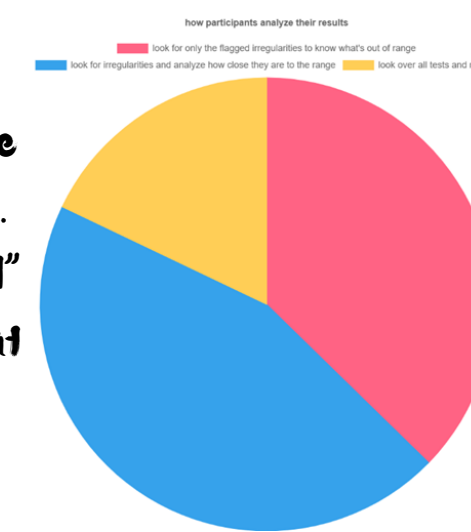
A 40-year-old female with no significant past medical history is having a routine checkup. Blood work was performed and her PLT (platelet) count is 130 (thousand) while the normal range is 140-440 (thousand).

and in the second part of the question, a medical history showing the same consistent low numbers was given. For both parts, participants had to analyze whether the patient was abnormal and if she raised medical concerns.



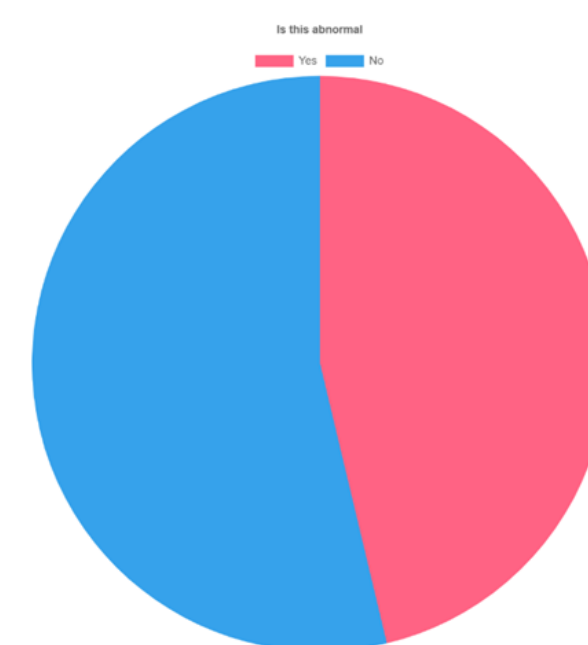
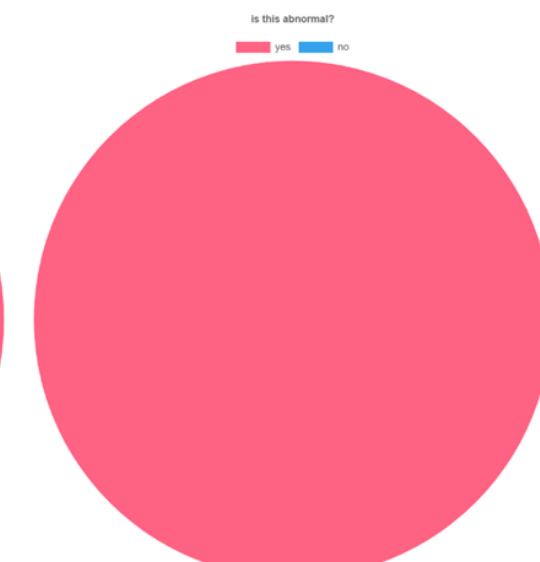
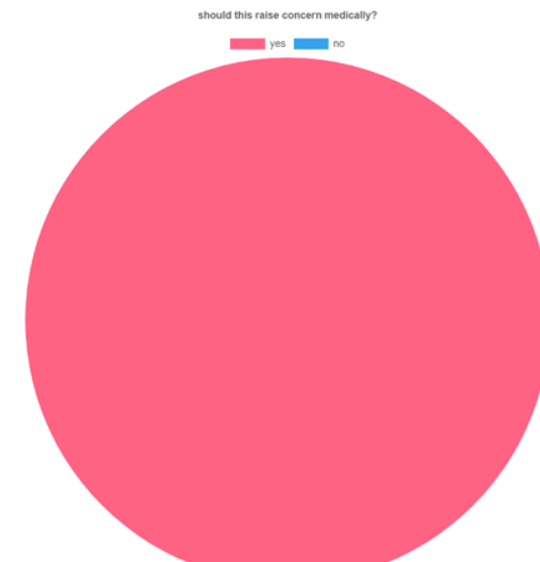
Majority of participants fall into the range of being tested every year or every other year which is an ideal range for the purposes of this study.

Majority of people focus on the results that are out of range, likely the idea that anything within range is normal and therefore not concerning. However, as of the majority of people who look at only their "abnormal" results, about 50% of them don't bother to look at the ranges, only that the number is abnormal no matter how it compares.



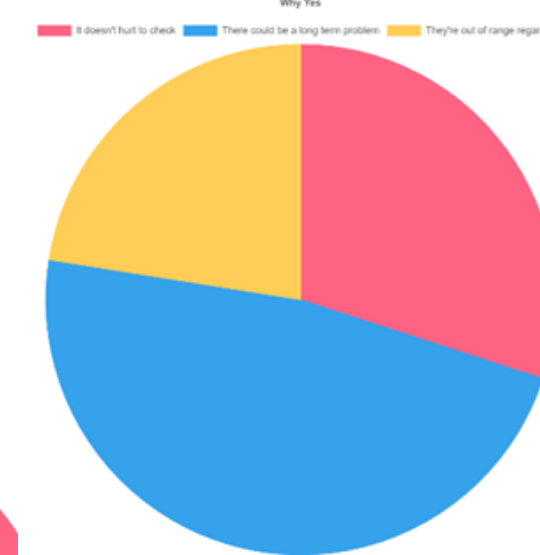
Initially these results came as a surprise, seeing how many participants had already used independent testing agencies. In fact, it was nearly split evenly between those who have already used these testing sites, those that would consider using them, and those that would not consider using them. However, this does demonstrate that the larger majority of people either already have or would use these independent lab testing sites.

In the first part of the study, all participants (100%) identified the patient's result as abnormal because it fell outside the reference range and thus raising medical concern given the singular out of range test



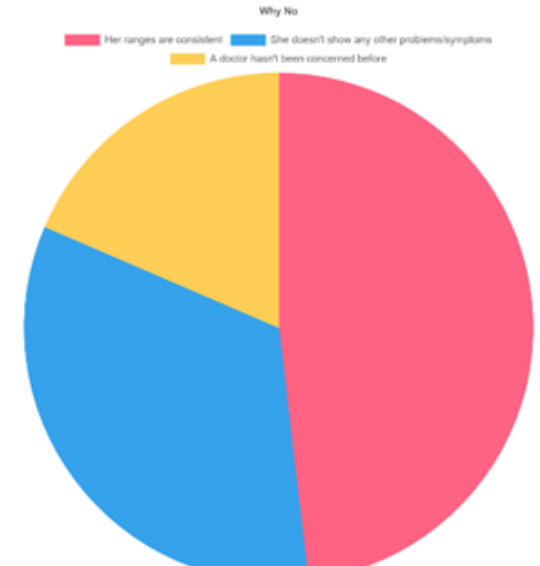
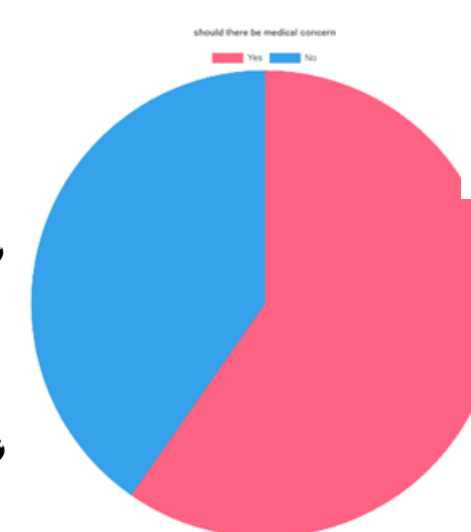
In the second part of the question, now when asked if the patient's results were abnormal, the participants were split nearly 50-50 between yes and no (more so leaning towards no). It is likely participants were having to decide whether they recognized her results as comparably normal to her previous records or if they still

recognized her results as abnormal to the reference range regardless of her previous test results.



In this part of the study, most participants agreed the patient's results weren't abnormal, yet many still believed there could be a medical concern. When asked to explain, those who said "yes" cited potential long-term issues or the idea that any deviation still warrants checking. Those who said "no" recognized the consistency in the patient's medical history and aligned with the study's message.

However, introducing the patient's history caused uncertainty, with participants wavering between reassurance and lingering anxiety about the possibility of an underlying issue.



Discussion

As per the results it can be assumed that when faced with one test result with nothing to compare it to, seeing a number outside of the generalized range will lead people to immediately raise a red flag and want to know why or what's wrong. However, when these results are compared to a series of results demonstrating a consistent trend for that particular person, they begin to see less of a problem, as it should be. We do need to recognize those who were concerned about an "underlying long-term condition" to which can be responded with the reasonings of some participants who answered no due to the fact that the patient has not shown any previous signs or symptoms of something being medically wrong nor has any medical professional raised concerns before. As such, it is likely there is no detrimental long-term condition and simply that this patient has a normal range which sits outside that of the normal range taken from the general population. As discussed earlier with the idea that for every reference range 5% of people will fall outside of that and with the many possible variables of the body, every person is likely to have something that they do not perfectly fit into the range for. If people were fully educated on the basis of the ranges and maintained the knowledge of the real possibility of having results that consistently fall outside of them, they would be able to better consider whether a lab result that is slightly off should really be given more time or money into further looking into. Not only that but it proved the necessity of having lab testing done during routine checkups in order to curate a sample of a person's "personal normal ranges" which can be more accurately compared to in the future. Lastly, given the high amount of people interested in utilizing independent lab agencies, being educated can spare them the time, money, and fears of seeing so many tests at one time and finding some numbers slightly out of the ranges.

This can also be applied to doctors and medical agencies who, though should be familiar with this concept, can at times not consider it and choose to further analyze a discrepancy in someone's lab results (depending on what was being tested). If someone has transitioned doctors and the new patient is showing differing ranges, that doctor, not used to the patient's medical history, may again call upon further analysis. Given enough medical history of previous testing, however, this would not be necessary as one could easily see the patient's consistency. It must also be recognized that there is of course a bias in education level in the area in which the survey was conducted as well as for who took the survey. It is possible a greater pool of people could show great or lesser education surrounding the topic or it could overlap with some already medical professionals.

References

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