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# A review of research into the benefits and risks of online self- diagnosis of health conditions

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## Abstract

Medical information is an abundant resource that has been collated and refined over time to allow those that study medicine to improve the health and well-being of society. Now, the internet has provided access and format for those with less training and experience in an attempt to utilise this information for themselves to varying degrees of success. Online self-diagnosis has become a new normal for the diagnosis of minor ailments, and issues and the sake of convenience. This review demonstrates a limited review of the risks and benefits of performing an online self-diagnosis based on an analysis of the literature surrounding different methods and aids of self-diagnosis over a range of demographics. This review discusses the barriers to accessing information, the quality of information utilised, benefits the process might bring to healthcare and ethical considerations behind self-diagnosis.

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## 1. Introduction

As information becomes easier to access, society requires fewer and fewer specialists in various fields of work providing help and expertise to the general population. It has become especially prevalent in the medical field where people can now choose to self-diagnose. The definition of self-diagnosis is the process of identifying healthcare conditions in oneself using various resources (Olson, 2021). Online self-diagnosis, utilizes resources commonly found on the internet, it can include chatbots, forums, medical information websites and published medical journals. This report aims to review literature that discusses the benefits of self-diagnosis. Discussed topics include reduction of stress and anxiety when consultation with medical professionals is unavailable and benefits to implemented healthcare systems through the utilization of machine learning and diagnostic aids. Also included within this report is discussion on the risks and negatives of self-diagnosis such as the accuracy of multiple sources found online and how it can be difficult to effectively utilize the information that someone may find.

## 2. Accessing and Effectively Utilizing Online Medical Information Used in Making an Informed Self-Diagnosis

In developed societies, medical information has been made available to the general population. This, in turn, presents the issue of some demographics struggling to properly access and utilize the information they find, particularly those that find themselves within certain age ranges. In a study by Silver in 2015 on how patients over 50 perceive online health information, 31 out of 56 participants had concerns about their abilities to both find and analyse the information they would use to treat a health issue (Silver, 2015). This lack of confidence suggests medical information online can be less accessible for those who have a harder time using mainstream technology. This can cause anxiety with 14 respondents stating they felt some sort of anxiety including feeling worse after looking up a health problem and thinking they have more health problems than they originally thought (Silver, 2015). If a person can get past technological barriers, they may face issues with understanding the

information that is provided to them. In a study on women's experiences in using online resources to aid self-diagnosis during the perinatal period, 12.2% of respondents found that information they found through multiple sources they trusted confusing and 15.7% didn't know how to apply the information with the understanding they had (Mackintosh, et al., 2020). This suggests that some people may lack the medical knowledge to properly utilise the information they are presented with. This is further demonstrated in the study on over 50s with 7 respondents feeling confused/overwhelmed and 4 stating they felt disorientated by the information (Silver, 2015). Improper use of medical information and advice can potentially cause an improper and dangerous self-diagnosis. If self-diagnosis leads to further medical care misunderstandings combined with inflexibility when learning can negatively impact relations between patients and health services and cause deterioration of effective healthcare.

### 3. How Online Self-Diagnosis Can Reduce Anxiety and Worry

With hundreds of thousands of different illnesses and diseases plaguing the world many being life-threatening, it can be extremely stressful to be in a situation where you are unsure of what is causing you pain or discomfort. Patients that are awaiting appointments may use the internet to research potential relief or treatments for their ailments or attempt to inform themselves of potential causes (Self-diagnosis). The internet has been seen to work as a means to self-diagnose or find information to ease patients' minds (Farnood, Johnston, & Mair, 2020). High stress can induce health-damaging behavior such as increased alcohol consumption (Gouin & Kiecolt-Glaser, 2011). Reducing stress can help with a patient's recovery as high psychological stress responses can directly influence the wound healing process (Gouin & Kiecolt-Glaser, 2011). The process of finding information to aid in a self-diagnosis itself can reduce mental strain by providing insight into future cause and effect. Reading about other experiences when self-diagnosing online patients can determine if specific treatments align with their values (Crijns, 2019). Experiences are abundant on medical forums meaning they can see a wide range of different outcomes. With 10% of the information found on forums being experience-based (Farnood, Johnston, & Mair, 2020), this can improve patients' mentality toward treatment and provides reassurance. Self-diagnosis through other experiences can reduce the stress a patient may feel, giving easy to understand

guidance and support in times of desperation something which straightforward medical information can lack.

#### 4. Accuracy Of Available Information Online Used in Making an Informed Self-Diagnosis

Medical information may be available online in vast quantities, but it can be difficult to find accurate or “correct” information. With many different websites including webchat forums, government websites, symptom checker websites and medical journals, it can be difficult for the average internet user to refine their search to find the correct information. It is recommended by the American nurse association that people looking for information online source it from an official government or medical association backed website (Olson, 2021) this however is sometimes difficult as it can be far more convenient to just “google it”. In a review of responses on 10 online health webchat and forum websites, it was found 10% contained information that was deemed unsafe and not evidence-based, 23% contained little to no supporting evidence and an overwhelming 46% was purely opinion based (Farnood, Johnston, & Mair, 2022). Other sources that are growing in popularity are online videos. They provide information in multiple entertaining formats ranging from seconds to hours including animations, tutorials, skits and more. However, with the growing popularity comes growing risk with unregulated standards of medical content and reported deficiencies, particularly in video quality this has already been noted across a variety of videos on urological conditions (Huang, Winoker, Allaf, Matlaga, & Koo, 2021-02). This has resulted in medical organisations and academic hospitals producing videos to counteract misinformation with those analysed in Huang, M. M. et al. found to contain no inaccuracies. However, videos containing inaccuracies were found to have more than double the viewer engagement in comparison (Huang, Winoker, Allaf, Matlaga, & Koo, 2021-02). This could be due to the larger focus on entertainment the non-academic videos have. This has the potential to mislead people and lead to diagnosis issues such as making a false diagnosis, overlooking potentially harmful symptoms, and causing stress and concerns over inaccurate information.

## 5. Reduction in Workload for Health Systems and How Machines Can Help

As populations expand it can be difficult for respective governments to provide quality healthcare and medical services to the entire population. Self-diagnosis can help to reduce unnecessary exhaustion of healthcare resources by providing solutions for minor issues. China, (population 2020: 1.411 billion (The World Bank Group, 2022)) struggles with overcrowded hospitals that lead to long queues and poor medical treatment (Wang, Zhang, Wang, Zhang, & Sheng, 2021). In 2021 a project by Wang, Zhang, Wang, Zhang, & Sheng aimed to use a cloud-based framework and machine learning to aid patients in either self-diagnosing or being referred to a specific medical department. The model, CHMBERT proved in simulated testing to be successful with a correct disease prediction (Top-1) 66.28% of the time (Wang, Zhang, Wang, Zhang, & Sheng, 2021). They concluded that further learning could also increase the accuracy of the model, the model not yet being deployed for public use. Other similar services such as online web-based symptom checkers are more common and currently in use by the general population. Symptom checkers focus on providing recommendations instead of accurate diagnoses, this includes recommendations for further specialized care. In a study by Semigran et al they found that in two-thirds of standardized patient evaluations where care was deemed unnecessary, symptom checkers would recommend seeking further care (Semigran, Linder, Gidengil, & Mehrotra, 2015). This means that, currently, when using online symptom checkers when self-diagnosing, it is possible to negatively impact healthcare services by wasting time and resources if certain advice is followed. Until recommendations improve or other models such as CHMBERT are implemented this issue can be mitigated by supplementing recommendations using multiple sources when self-diagnosing.

## 6. How Can Self-diagnosis Provide a Safe Space For Sensitive Issues

People may find it difficult to approach a medical professional for advice on issues that have large amounts of social stigma such as sexually transmitted diseases and mental health

disorders. In a study on the main categories of disease when consulting an online chatbot it was found that sexually transmitted diseases were consulted more frequently online compared to in a hospital (Fan, et al., 2021). This can be attributed to the increased privacy of using online services in the comfort of your living room where the awkwardness and anxiety of verbally communicating your issues with a doctor are removed. Within the same study other areas of diagnosis that also entail considerable privacy such as urology (diseases of kidneys, bladder and prostate (The British Association of Urological Surgeons, 2022)) were also found to be consulted online using a chatbot at a higher frequency compared to visiting a hospital. Utilization of self-diagnosis in this way, where human to human contact is limited, is beneficial to those with anxiety (where they feel a strong sense comparable to unease, worry or fear) who before self-diagnosis may have allowed for conditions to worsen and potentially become life-threatening before being forced to seek a medical professional for aid.

## 7. Consideration of Ethics and Online Self-diagnosis?

Self-diagnosis may be morally questionable from both a doctor's and a patients' point of view. Consequentialism states that if the good consequences outweigh the bad it is ethically good. This raises the question if a large portion of online medical information is deemed to be inaccurate [such as the 46% of opinion-based information in web forums (Farnood, Johnston, & Mair, 2022)] what is the probability of the result of a self-diagnosis is being "good". Reductions in "bad" results could include learning machines such as CHMBERT which showed high accuracy when guessing a correct diagnosis (Wang, Zhang, Wang, Zhang, & Sheng, 2021). This would align with utilitarianism, where maximisation of human welfare is key. This would mean that utilising machines to perform an aided self-diagnosis would be ethically good as it has the potential be highly accurate, thus improving human welfare through correct diagnoses. From the doctor's perspective, is it ethical to suggest that patients should seek online information to perform a self-diagnosis? Of the 4 medical ethical principles (Autonomy, Non-maleficence, Beneficence and Justice (Reynolds & Mitchell, 2019)) autonomy suggests that a patient has the freedom to perform their own self-diagnosis if they are sound of mind. However, the lack of accuracy with some medical information, can at times, be harmful to the



patient. This conflicts with non-maleficence (to do no harm) as just by the suggestion of self-diagnosis a doctor could potentially (though indirectly) bring harm to a patient. On the other hand, beneficence suggests that something good for one person may not be good for another so it could be said that online self-diagnosis would be beneficial and ethically good depending on the situation.

## 8. Conclusion

The literature discussed suggested that self-diagnosis is neither good nor bad, but it depends on the situation in which it is applied and the tools and resources available to the person performing the diagnosis. While there are large quantities of information available to the public through online resources, the accuracy of sources and diagnostic tools must always be scrutinized and reviewed before any self-diagnosis is made. Self-diagnosis can also be seen as ethically good for simple and minor health issues where there is little risk of causing further harm to oneself. Larger and more serious health issues should always be dealt with by a trained medical professional as they are less likely to succumb to issues discussed in self-diagnosis such as overlooking symptoms and false diagnosis. Finally, the literature suggests areas of research and development such as CHMBERT and other artificial intelligence will prove beneficial to those who struggle to make appointments and/or reach medical professionals but still require development to increase the accuracies of these technologies.

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