

Use of Artificial Intelligence in Medical Research

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The field of Medicine is heavily dependent on evidence-based decision making. This process in turn, feeds off two major sources – the Randomized Controlled Trials (RCTs) and the consequent Meta Analyses. Experts in the field would then peruse these bodies of evidence to formulate guidelines and position statements to help the professionals deliver a standard treatment to their patients.

However, this genre of evidence-based medicine is not without its share of fallacies and shortcomings. The inclusion and exclusion criteria followed in RCTs intrinsically create an outlier effect – big or small¹. The findings of such RCTs might be applicable to a reasonable number of patients who will benefit from the conclusions of the RCT. The patients who do not fit into the criteria cannot, however, be denied treatment. This fact, therefore, brings into focus the need for personalized medicine. In addition, patients do not present to the professionals with a unidimensional disease process. Overlaps of different diseases are common and applying one set of guidelines designed for a particular condition then becomes difficult.

Medical Research has the onerous task of focusing on much larger data sets and data points than have so far been included in RCTs². Such large data sets usually throw up new disease patterns and phenotypes (Sepsis being an example) on which future research can focus on. Analysing such large number of data points and sets is beyond the realm of conventional statistical tools. Artificial Intelligence (AI) based platforms on the other hand, can rapidly analyse enormous sample sizes and unearth patterns and behaviors of disease. Similarly,

interpretation of radiological and biochemical parameters from millions of data points is best done by AI based systems with a quicker turnaround time.

Patient safety is an integral part of all research activities. Predictive analysis algorithm on AI platforms can predict the safety of the research protocol and forewarn the investigators of potential adverse effects. This helps in the genesis of studies which are methodologically safer and can continue to their logical conclusions.

As mentioned earlier, diseases and disease patterns overlap quite often. Formulating a study design for such overlapping patterns is difficult and challenging. AI could probably help in understanding the intersection of multiple syndromes, thereby developing a study design for complex scenarios.

Monitoring of patients who are enrolled in a study is of paramount importance. Conventional research focuses on interim analysis to identify adverse events. A percentage of patients would have suffered the adverse impact of the study protocol despite such interim review. Surveillance systems based on AI are effective in predicting and pre-empting adverse effects of a protocol. In addition, the AI based surveillance systems provide an active real time feedback and audit mechanisms which helps in minimizing adverse effects³.

Overall, the advent of AI into the realm of medical research promises to provide new insights into disease patterns and behaviors, helping researchers in identifying new therapeutic targets. AI also seems to be better

equipped in making medical research safer and personalized.

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