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Medical Science and inter-disciplinary research

First of all, let me thank the organizers for inviting me to speak at this forum. Basically, in medical research we have two aspects. One is primary research and the second one is secondary research. So we are mainly concentrating on the primary research, where there are three types of research. One is basic science research that is done by basic scientists who are involved in medical practice and the medical investigations. That is like biochemistry research, physiology research and things like that. Then second comes epidemiological research. Epidemiological research is mainly helpful to find out disease patterns, disease correlations, causations, and various patterns of diseases. Then, clinical research mainly concentrates on inventing drugs and using drugs, whether the drugs are clinically effective, whether the investigating methods are effective, etc. So, there are three types of research. And then there is secondary research, which is basically armchair research where people gather all the existing evidence from research and see how they fit into existing knowledge and how it is going to affect the practice further. So that is secondary research that is also a main research practice in the medical field. So, this research provides us with evidence to treat patients in a better way.

So the next question is how does this research, or various types of research, fit into normal practice. So for that, I will move onto my next slide. There are various levels of evidence. In this pyramid, at the bottom is personal opinion and expert opinion without any scientific data, or any research methodology involved. The experts take decisions based on their own experience. Then the second layer brings out important clinical research and epidemiological research that will give us some knowledge about how to treat the patient, what drugs to use, what drugs are effective, how the manifestations are and things like that. The top level of the pyramid is the cumulative evidence where people analyze the research output and see how it can be implemented in clinical practice. There are various methodologies adopted to arrive at decisions at this level. Clinical trials are an important methodology in this regard. Like in the social sciences, we have cross-sectional studies.

So, what is the research output? Research output depends on the type of study that we are going to do. Most of the epidemiological research will end up as a descriptive type of output where it will say how many people are having such and such a disease, what percentage of affected patients will die within a period of time, and things like that. So, it is a descriptive result that will come out of major epidemiological studies. It will also give patterns of epidemics, how to control it and control measures, and how effective these control measures are. All of these will come under the epidemiological study output.

We also have studies on causation: various types of diseases are produced by

various types of organisms, various risk factors are involved in producing various types of diseases. So, we do research to find the causation of what risk factor contributes to what disease and how one organism causes one disease. So that type risks and causative factors can be found out by various types of studies. For example, case control studies and cohort studies are the mainstay of this type of research output.

Then there are studies on the efficacy of intervention. Efficacy of intervention mainly is an output from clinical trials, where we try various drugs and see whether it is effective: for example, 'x drug is much more effective than y' and things like that. So, we study whatever the intervention – it may be psychological treatment, maybe some instrumentation or some kind of intervention in a group, whether it is better than non-intervening treatment or some other intervention. It's a comparison and that is the main type clinical research – where we investigate whether one type of intervention in a person's disease condition will improve the person better than some other intervention or a placebo. So that is mainly carried out in a research strategy through clinical trials. Clinical trials also can be used to see the efficacy of various diagnostic procedures. For example, sometimes CTs can be better than MRI and CT angiogram is better than MRI angiogram. So how do you come to a conclusion whether this is better or that is better? This type of research also comes under clinical trials.

Then various types of inventions are also important because in the basic sciences we do mainly the invention of new drugs and various other instruments. For example, computer applications used in medicine and all sorts of things can come under inventions. So, the output can be new inventions in medical sciences. So not only in the sciences, in medical sciences also, inventions are very important because inventions can reduce risks for patients during investigations and various types of interventions.

Then the last type of output is that which contextualizes new knowledge. So, all these research output, the previous types - clinical, epidemiological and basic science research output - will be combined and analysed and seen how it fits into existing knowledge or how it is going to change existing practices. This is another type of research which is called secondary research. This is also important but it's a very theoretical way of analysing the already existing data and putting it into context.

Research outcomes of course are entirely different, as previous speakers mentioned. How the findings affect bedside treatment is the research outcome in medicine. So, research outcome takes a long time and there are various factors and various bodies that are involved in these types of final outcomes. That's an entirely different type of topic.

Our output is mainly in terms of publications. Our publications of course vary from other types of specialties because our studies have multiple authors. Single author publications are not possible in Medicine because it's a collaborative work. Also, for example, in secondary research, an article can be reviewed by a single person but for primary research, you need a team.

In medicine, publication can happen at various stages. Even the study design can be published and protocols are published. These two types are published to claim ownership for the method that they introduce in the study process. An interim analysis can be published if the intervention is much more effective than the placebo. We then inform the general public and the scientific community before the end of the trial. Then the final paper and the post hoc analysis can be published. Some studies lead to new findings. Some studies can give rise to new hypotheses and further studies in the future. Reviews are also published as secondary research. The evolution of conventions is important because we are dealing with patients and our research is going to affect patients and patients are going to be our subjects. So that is why it is important to develop conventions and a systematic approach in scientific research.

Lastly, there are threats. In addition to what Prof. Athula Ranasinghe said, there are additional threats in in our field. In common to both science and medicine, there is a general lethargy in research. That is the main threat for us. Then, there is the threat of the lack of quality. Everything from individual case reports to case series to interventional trials are regarded in the same vein and regarded as equal. Then there is also lack of quality in analysing the results. And lack of funding is a major issue, as well as the lack of support from the government and the university. For example, we did research and got a patent for a cinnamon tablet. Ceylon cinnamon is known as the classic cinnamon. Even in Western literature, if they say classic cinnamon, it always means Sri Lankan cinnamon. But we are unable to produce that tablet yet because of the long processes that we have to go through. Then, the lack of a critical approach in evaluating research output is a major impediment in this country, and in many countries, to ensure good quality research. With this I end my talk and will have a discussion if it is needed.

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