CME

Evidence based medicine- utilizing existing databases

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INTRODUCTION

Many research questions can be answered quickly and efficiently using data that has already been collected. There are 3 general approaches to using existing database. Secondary data analysis utilizes existing data to answer research questions other than the main one for which the data was actually collected. Ancillary studies are the other ones that add one or more measurements to a study often in a subset of the participants, to answer a separate research question. Evidence Based Medicine (EBM) utilizes existing data base systematically by summarizing and applying information from the literature to answer specific research questions. The main advantages of using existing data are speed and economy of obtaining answers to the research questions.

This paper discusses Evidence Based Medicine in terms of strengths and weaknesses of such studies. So that researchers get an insight into creative use of existing data to answer important research questions. EBM demands the use of information from clinical trials to direct medical care. Systematic reviews and Meta analysis studies are the building blocks of EBM. The statistical aspects of a systematic review that is; calculating summary effect estimates and variance, statistical tests of heterogeneity and statistical estimates of publication bias are called meta-analysis.

SYSTEMATIC REVIWS (S.R.)

A systematic review can be a good opportunity to researchers for identifying completed studies that address a research question and evaluate the results of these studies to arrive at conclusions about a body of research.

Here are some of the strengths of systematic reviews. In contrast to other approaches to reviewing the literature, systematic reviews use a well-defined and uniform approach to identify all relevant studies, display the results of eligible studies and when appropriate, calculate a summary estimate of the overall results. As it combines the results of multiple studies of a given research question, often including calculation of a summary estimate of effect that has greater precision than the individual study estimate. The findings with power enhanced by larger sample size available from the combined studies and peculiarities of individual study findings as compared with others often represent an important scientific contribution. Here the investigator becomes familiar with the literature regarding the research question. SR does not require substantial financial or other resources as it uses existing data. Also time of doing research is reduced. Systematic review findings can be particularly useful for developing practice guidelines for medical as well as health care providers.

However, like other studies it has certain weaknesses. The biggest drawback to a systematic review is that the researchers do not have control over the quality of the studies on which it is based for instance, the selection of the population to study, which data to collect, quality of data gathered, and how variables were measured and recorded are all predetermined. Moreover the process of assessing quality is complex and problematic. Important confounders and outcomes may not have been recorded or measured in the studies on which SR is based. Nevertheless the SR has established itself as a good scientific tool in the hierarchy of evidence in medicine.

META-ANALYSIS (M.A.)

As said earlier, it is the statistical aspect of systematic reviews. It is for the purpose of drawing global conclusion concerning the safety and efficacy of that treatment. It is an observational study in which the units of observation are the individual trial results. Sometimes the terms systematic review, overview and meta-analysis are used interchangeably. Meta-analysis can give a quantitative (statistical) approach to summarizing information in multiple studies complementing expert “overviews”.

This approach has its own strengths even as it increases sample size and thereby potentially enhances statistical power. It provides more rigorous review of literature. A key advantage is that it enhances the statistical significance of subgroup analysis and hence enhances scientific credibility of certain observations. A MA may help put into focus the results of a controversial study and it can resolve uncertainty when reports disagree. MA also improves estimates of effect size. It becomes particularly valuable in answering questions that were not posed at the start of individual trials, but are later suggested by the trial results.

Although, generally regarded as highest level of evidence in research setting, sometimes it is viewed to be authoritative. Sometimes it is viewed as equivalent to a large multi-center study but it is better to view it as an observational study in which the 'observations" are not under control of the meta- investigator and have not been obtained through a randomized and blinded technique. Moreover, it has to be assumed to have certain statistical properties which it actually may not have. MA is also prone to certain biases e.g. Systematic bias: bias in individual studies flows to the meta-analysis and causes overall bias. Selection bias arises when studies are preferentially included or excluded influenced by the meta-investigator's prior beliefs or when studies are included based upon recognized authorities. Publication bias would creep in when selective studies are published based on the direction and magnitude of their results. This is a real concern and some effort to account for it is needed. The magnitude of this bias tends to be greater for observational studies than for RCTs.

Inferences can also be inaccurate if we do not allow and account for heterogeneity. Heterogeneity needs to be accounted for in inclusion and exclusion criteria; handling of withdrawal, dropouts or crossovers; quality of design and execution; different control or treatment interventions; differences in outcome measures; follow up times; outcome definitions; different base line states of patients and different settings. Investigator bias would occur when the investigators who conducted individual studies included in the meta-analysis introduce their own bias[1].

A CASE STUDY[2]

A meta analytic review which was conducted to examine whether the behavioral interventions addressing adherence to Highly Active Anti- Retroviral Therapy (HAART) are successful in increasing the likelihood of a patient attaining 95% adherence or an undetectable HIV-1 RNA viral load, is interesting. The authors searched electronic databases from January 1995 to September 2005, consulted with experts in the field and hand searched reference sections from the research articles. 19 studies with a total of 1839 participants met the selection criteria of describing a randomized controlled trial among adults evaluating intervention with HAART adherence or viral load as an outcome. Random-effects models indicated that across studies, participants in the intervention arm were more likely to achieve 95 % adherence than those in control arm (Odds Ratio = 1.5 and 95 % CI 1.16 to 1.94). The effect was nearly significant for undetectable viral load (Odds Ratio = 1.25 and 95 % CI 0.99 to 1.59). The intervention effect for 95 % adherence was significantly stronger for studies that used recall periods of 2 weeks or 1 month vs. < 7 days. No other stratification variables (i.e. study, sample, measurement, methodological quality, intervention characteristics) moderated the intervention effect. This is a good example of using EBM for use of information from clinical trials to direct medical care.

It could be concluded that, in an extensively researched disease area if a systematic review has to be planned it should be designed with a complete written protocol before the study begins. The protocol should include the research question, methods of identifying all eligible studies, methods of abstracting data from the studies and statistical aspect of systematic review that is calculating summary effect of estimates and variance, statistical tests of heterogeneity and statistical estimates of publication bias to be done as meta-analysis. Say, for instance, to begin with the researchers at Medical Colleges can start with a systematic review and meta analysis of the research area using the available database of all PG dissertations of last few exams.

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SURRENDER ?

- **In first industrial revolution, man was forced to sell his (surrender his) muscle power to terms dictated by machines.**
- **In second industrial revolution, man was forced to sell his brain power to terms dictated by machines (computer).**
- **In third industrial revolution, man shall have to surrender his muscle power and brain power to terms dictated by robotics.**

OVER THE CENTURIES

- **17th century was century of enlightenment. Man was always wondering what was happening around him?**
- **18th century was century of reasoning. Man tried to find out (reason out) why things were occurring?**
- **19th century was century of progress, i.e. industrial revolution.**
- **20th century was century of neurosis - Anxiety neurosis.**
- **While 21st century shall be century of psychosis.**

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