CRITICAL REVIEW OF QUANTITATIVE RESEARCH – GUIDELINES

The following guidelines were adapted from many sources that outline how to critically evaluate the research literature (refer to reference section at the end of this document). As clinicians, it is essential to examine current research in order to make evidence-informed decisions about one's practice. As such, the items listed below should be taken into consideration when reading a piece of literature (i.e. a peer-reviewed journal article), in order to evaluate its relevance and applicability to your work, and the quality of the research presented. The following is to be used to guide you through a research paper with the intention that consideration of these items should be used on a regular basis when you consult the published literature for information. To assist you in this process, we have developed a worksheet help you critically review the literature.

Quantitative Research focuses on the frequency or occurrence (numerical outcomes) of events and is useful for guiding decisions around screening, diagnosis, therapy and prognosis. Cause-effect relationships are often determined using this research style.

Quantitative methods:

• should begin with an idea (usually stated as a hypothesis);
• generate data through measurement;
• allow a conclusion to be drawn by deduction;
• if done well, are reliable - that is, the same measurements yields the same results time after time or between different researchers;
• if done well, are valid (close to the truth, representative of what is sought) - that is, they should address the key question/topic appropriately and examine the core of what is going on rather than just skimming the surface.

GENERAL ITEMS TO CONSIDER WHEN READING QUANTITATIVE LITERATURE:

CITATION

• The citation includes the title of the study, all of the authors (last name, first name or initials), as well as the information about the journal in which the study was published – it’s full name, volume, issue and year of publication. This information ensures that others can easily retrieve and reference the article at a later time if needed.

INTRODUCTION AND BACKGROUND INFORMATION

• The purpose of the study is clearly stated either as a statement (“The purpose of this study was...”) or question. The purpose is normally located in both the abstract and the introduction (very often the introduction’s last sentence) of the paper;
• The literature review presented in the paper provides a brief synthesis of previous research and background information that lead to the performance of the study. The review should be relevant to the area being studied and is up to date (ie. compare the
year of the study you are reading to the works that are cited in the literature review). The literature review should present the justification or need for the study. This justification could be in the form of identifying any gaps in previous research ("to date, no one has looked at...") or a specific need for the current study to be done ("without this study, there would be detrimental effects in X, Y, and Z");

- Any hypotheses (ie. expectations) of the study’s outcomes are stated in the paper. Usually, the hypotheses are located near the purpose in the introduction. Hypotheses may be worded in a variety of different ways, including “It is hypothesized that...”, “We expect that...”, or “It is anticipated that...”. Sometimes hypotheses are not clearly stated but can be inferred by what is stated in the purpose.

**METHODODOLOGY**

- The research approach (or study design) is either stated from or implied in the writing. Researchers may explicitly tell you what design was used or it will even be in the title of the article itself, particularly in the case of Randomized Clinical Trials (RCTs). Very often, the researchers will not tell you the research design outright, but will give sufficient description of the methods to identify the research approach used. Refer to Table 1 for more details on the various approaches that could be used in quantitative research studies.

- The intervention or treatments are clearly explained in the paper. That is, you know exactly what the subjects in the study have undergone (ie. timelines, doses, measurements, etc). If comparisons between groups are made, they are also clearly defined (ie. placebo versus drug).

- The measurements or outcomes that were examined by the study are identified. The authors also comment on the reliability (repeatability) and validity (effectiveness) of the measurements used. If there are limitations to the outcome measurements, they are acknowledged by the authors.

- The study is approved by an appropriate Research Ethics Committee (or Board). At the very least, the researchers report that informed consent was obtained prior to the start of the study. This information is normally stated at the beginning of the Methods section in the article.

**SAMPLE**

- The number of participants/subjects (the “N”) is clearly stated in the methods section. The sample size should be justified by the researchers and may be reported as statistical calculations.

- The characteristics of the participants (subjects) in the study are explained. A characteristic chart may be included within the study description, particularly if two groups are being compared. The characteristics of two comparison groups should be similar at the start of the study, so that it is clear that any changes in outcome variables are associated with the study (or intervention) itself.

- There is evidence of random sampling and/or random selection in the study. That is, the subjects are chosen from the general population in a random fashion (randomization) and also allocated into different groups in a random fashion (random
selection). This helps to decrease the bias of the study. Random selection is often not possible in health research and therefore convenience samples (i.e. one group receives the intervention and the other group does not) are used.

- The length of time the subjects were a part of the study is indicated. If any subjects dropped out (for any reason) from the study, this is also stated and explained.

**RESULTS & ANALYSES**

- The outcomes (variables) reported are important and of interest to the researchers. It is helpful to list any/all important outcome information for future references. Are the measures well-known and used? Are they valid and reliable?
- All of the measurements that are cited in the Methods section are reported in the Results section. That is, even if there was no difference in a specific outcome, it is still mentioned as a result.
- Statistical information is provided for all results. This would include the mean, standard deviation (or standard error), significance level (normally presented as a “p” value or a confidence interval, “CI”), probabilities, etc for quantitative studies and thematic analyses, triangulation, etc for qualitative studies.
- The clinical importance of the findings is reported and/or is apparent in the study. Furthermore, the findings of this study are of particular importance to your own work or project.

**CONCLUSIONS & DISCUSSION**

- The conclusions made by the authors are directly related to the findings from the study. That is, the authors do not jump to any grand conclusion without sufficient evidence. An example of this is: a study finds that Drug X shrinks the size of brain tumour cells. The authors further conclude that Drug X is a cure for cancer. As we know, there are many other factors that are potentially involved in this process and the authors can only conclude that Drug X shrinks the size of brain tumour cells in a particular sample and nothing more.
- The funding source for the study is identified. This is normally cited after the conclusion section, in a smaller “Acknowledgements” section in smaller type font. It may also be cited within the text of the paper or at the bottom of the front page.
- The study helps you with your own work, the project and/or question that you are investigating. For example, if the study you read examines the effect of a daily walking program on elderly health and well-being, one might apply this information to a question examining whether exercise enhances mental health outcomes. Although the published study is not exactly the same as the research question, it is so close that it could be used to inform any decisions you make for your own work.