

Special Article

Meta-Analysis Planning Related to Geriatric Health: Case Report

Emine Ergin, PhD

Research Assistant, Department of Public Health Nursing, Konya, Turkey.

Correspondence: Emine ERGIN is Research Assistant, PhD Department of Public Health Nursing, Konya, Turkey. E-mail: eminesariselcuk@gmail.com

Abstract

Meta-analysis provides new insights to help reveal the effect size of studies and to develop new social policies. Meta-analysis is frequently used to solve problems related to geriatric health. This research is often used when multiple and conflicting results of a problem are obtained from literature. Especially the meta-analyses that assess the effectiveness of the implemented initiatives increase the quality of care in elderly and contribute to the development of social policies. Meta-analysis, which is a part of systematic review, contains a number of difficulties for many researchers regarding planning and prediction. Since meta-analysis planning requires a dedicated effort, expertise and technique, there are various challenges that impede the progress of this process. This article examines the situations that are and may be encountered when a meta-analysis study is planned especially in the field of geriatric health. Furthermore, suggestions are made to assist meta-analysts in this process.

Key Words: Nursing, meta analysis, case report, elderly health

Introduction

The meta-analysis research is a different research method that includes approaches compatible with other research syntheses. This approach involves embodying the identification, analysis and synthesis of quantitative data obtained from previous studies with a scientific point of view. Clarifying the effect magnitude of meta-analyses and determining new effect magnitude values contribute to the provision of different approaches to develop social policies (Dincer, 2014; Littell et al., 2014). Most researchers focus on the synthesis of strong evidence with a focused question and comprehensive screening rather than on weak evidence as systematic review and meta-analysis researches rapidly develop (Petticrew, 2015). Meta-analyses contain difficulties in planning and predicting for many researchers. A meta-analysis has several stages including planning and implementation. Meta-analyses consist of different steps; deciding what information should be extracted from studies for use in meta-analysis, choosing between fixed, random, or

mixed models for analysis, discovering moderators' possible confusing effects in the analysis and making analyzes and interpreting results, all of which are associated with each other (Harris et al., 2009; Terri, 2012).

Meta-analyses constitute the top-level when studies which are carried out in accordance with an evidence pyramid are ranked in terms of evidence value. There is a greater need for meta-analyses in the field of nursing. Especially the meta-analyses that assess the effectiveness of the implemented initiatives increase the quality of care and contribute to the development of social policies. Nursing interventions are based on scientific knowledge; therefore, nurses use their professionalism in the direction of this information during the decision-making process. The research of meta-analysis has been used by nursing sciences in recent years and there is a need for more meta-analysis work in this field (Cui et al., 2018; Kojima, 2018; Shin et al., 2015).

The systematic review process in meta-analysis

is similar to the research process. These processes include identifying the problem, selecting the sample, collecting, analyzing and interpreting the data and presenting results (Higgins et al., 2003; Terri, 2012). Meta-analysis provides an efficient way to summarize the results of a large number of studies and to reveal previously unrelated relationships. There are certain standards for meta-analyses but the current standards vary in quality. Carefully conducted meta-analyses can offer up-to-date transparency in the presentation of research findings. Discipline and transparency provide the least amount of bias (Higgins et al., 2003; Littell et al., 2014). The main advantages of meta-analysis are as follows (Hunter & Schmidt, 2014):

- Better estimation of parameters
- Evaluation of results in multiple areas
- Minimizing error and bias.

The most frequent criticisms of meta-analysis are due to faulty application techniques. Many erroneous meta-analyses published in different areas such as health, education, or psychology are based on faulty techniques or sources known to be biased. In this case, while meta-analyses have the potential to provide useful information, it can also produce false and misleading information (Katerndahl & Cohen, 1987; Littell et al., 2014).

Meta-analysis is frequently used to solve problems related to geriatric health (Gray et al., 2017; Holvast et al., 2017). This research is often used when multiple and conflicting results of a problem are obtained from literature. More efficient results can be obtained from traditional systematic oversight and meta-analysis if researchers are to synthesize different kinds of evidence. Meta-analysis reveals new insights in revealing the magnitude of the impacts of research and the development of new social policies. Meta-analyses, as part of systematic reviews, present difficulties in planning and predicting for many researchers. Meta-analysis planning requires a determined effort and expertise and technique (Dias et al., 2018; Gurevitch et al., 2018). Thus, there are various challenges prevent this process from progressing. Meta-analyses are increasingly needed in nursing and other sciences because the importance of evidence-based applications is increasing, however there are difficulties in practice (Ngyuen & Singh, 2018). This article examines

the challenges faced when planning a meta-analysis study, especially in the area of geriatric health, and presents recommendations to meta-analysts in this process. The article is based on a case study of experiences during the planning of a meta-analysis study. In addition to reviewing secondary sources, this study employed onsite participant observation and in-depth semi-structured interviews, which are primary data collection methods. The systematic review process in the meta-analysis is similar to the research process (Dias et al., 2018). These processes include identifying the problem, selecting the sample, collecting, analyzing and interpreting the data and presenting results. Ph.D. students and academics can use this research to help all professionals working in their field by making significant contributions to knowledge.

Case

In this study, a student writing her Ph.D. thesis using meta-analysis on geriatric health was selected as a case. The strategies, challenges and methods of coping in this process as well as recommendations to researchers were presented.

Applied Strategies

After deciding to perform a meta-analysis, priority issues and solutions globally as well as in Turkey in terms of geriatric population were evaluated. In the meta-analysis planning phase, the research topic was determined first, then an investigation was carried out as to whether a meta-analysis was done in the last 10 years. Because if an up-to-date meta-analysis has been done then different aspects of the problem must be investigated. Following this a conceptual framework was designed (Holvast et al., 2017). Researching if there were a sufficient number of studies on the priority health concerns of the elderly population globally and in Turkey (falling, physical health, mental health, etc.) was required before doing a meta-analysis. The presence of studies with sufficient quantity and quality makes it more likely for these studies to be included in meta-analysis, and they improve the quality of meta-analysis as well. The [Problem, Intervention, Comparison, Outcome (PICO)] formulation was used in this study when creating the research question (Van Loveren & Aartman IH, 2007).

Benefited MeSH (Medical Subject Headings) terms for selection of key words. Databases (Pubmed, Cinahl, Medline vb.) that are widely

used in the world to related to their field identified (Nelson et al., 2001). Scanning was started within the framework of key words and inclusion criteria determined using resources such as libraries. The first stage of this systematic review involved the evaluation of titles, abstracts and eligibility of studies. In the second stage, full text of the papers was independently assessed by two independent observers to confirm their eligibility. Two independent observers who have worked on research and elderly health ensured the reliability of the coding. Coding protocol including study number, title, authors, year of the study, country of the study, publication type, status of being published, content, objectives, status of receiving institutional services, elderly population studied, status of whether or not using model, the frequency and duration of the visits, study design, sample size, dependent and independent variables analyzed in the study, calculated measures and statistical methods used for coding.

Comprehensive Meta-Analysis (CMA) version 3 program to apply the meta analysis technique. The statistical heterogeneity of the combined studies tested using the I-squared, which describes the percentage of total variation across a study due to heterogeneity rather than chance. Publication bias will also be assessed using a funnel plot, Orwin's failsafe N test, and Duval and Tweedie's trim and fill tests (Fragkos et al., 2014; Michael et al., 2009; Noel, 2012).

What Challenges Were Experienced?

Study characteristics, the risk of subjectiveness in studies included, the types of initiatives (interventions) and the methods used to evaluate their effects were examined. According to the this case report, there is not enough sufficient randomized controlled work appropriate to inclusion criteria. So all quantitative studies that meet the inclusion criteria are included.

Searched fund for the analysis program for meta (CMA) and CMA program was used for analysis.

Coping Ways

A case three courses are taken to improve proficiency in meta-analysis. Projected this work in order to get the CMA program to do the meta-analysis. Used international protocols into consideration during the writing and reporting process. Recommendations for researchers: Planning with the use of criteria and tools such as and flow diagrams and PRISMA, suggested

by Cochrane Collaboration, will make meta-analysis more convenient for researchers (Armijo-Olivo et al., 2012; Moher et al., 2015).

Discussion

Determining the conceptual framework was determined to be the most prominent challenge encountered especially with the bias and quality assessment. The study characteristics, the risk of bias in the included studies, the types of intervention, and the methods used to assess the effects of the intervention were examined. Taking into account the criteria and tools proposed by Cochrane Collaboration, such as Prisma and flow diagram would provide convenience to the researcher.

The purpose of this case report is to give information to the researchers about the meta-analysis method which helps to obtain high level of evidence from contradictory situations. The problems such as the falling in elderly can decline with home visits. For example home visits by nurses reduce hospitalization and mortality in the elderly, and provide for the prevention of many risky situations such as falls and nutrition. It has a positive effect on many physical and psychosocial health outcomes by improving the quality of life of the elderly (Mayo-Wilson et al., 2014). There is scientific evidence that frequent home visits, especially in young elderly (60 years), reduce mortality and hospitalization (Chatterji et al., 2015; Dickinson, 1996; Stuck et al., 2002). However there are also conflicting results in studies evaluating the effectiveness of home visit programs for elderly people (Gillespie et al., 2009; Stuck et al., 1993). Meta-analysis studies are needed in the field of elderly health. For the increase the evidence-based applications and high quality methodological studies. This case report is thought to show the way to researchers who are interested in meta-analysis.

References

- Armijo-Olivo S, Stiles CR, Hagen NA, Biondo PD, Cummings GG. (2012) Assessment of study quality for systematic reviews: a comparison of the Cochrane Collaboration Risk of Bias Tool and the Effective Public Health Practice Project Quality Assessment Tool: methodological research. *Journal of Evaluation in Clinical Practice* 18(1): 12-18.
- Chatterji S, Byles J, Cutler D, Seeman T, Verdes E. (2015). Health, functioning, and disability in older adults—present status and future implications. *The*

- Lancet 385 (9967): 563-575.
- Cui C, Li Y, Geng D, Zhang H, Jin C. (2018). The effectiveness of evidence-based nursing on development of nursing students' critical thinking: A meta-analysis. *Nurse Education Today* 65 (2018) : 46-53.
- Dias S, Ades AE, Welton NJ, Jansen JP, Sutton AJ. (2018). Introduction to Evidence Synthesis. In: *Network meta-analysis for Decision-Making*. 1st Edition, Johns Wiley & Sons, UK, 3-9.
- Dickinson E. (1996). Long term care of older people. *BMJ: British Medical Journal* 312(7035): 862-863.
- Dincer S. (2014) Introduction to Meta Analysis. In: *Applied meta-analysis in the educational sciences*. 1st Edition, Pegem Academy, 2-12.
- Fragkos KC, Tsagris M, Frangos CC. (2014) Publication bias in Meta-Analysis: Confidence intervals for rosenthal's fail-safe number. *International Scholarly Research Notices* 2014(2014):1-17.
- Gillespie LD, Robertson MC, Gillespie WJ, Lamb SE, Gates S, Cumming RG, Rowe BH. (2009). Interventions for preventing falls in older people living in the community. *Cochrane Database Syst Rev* 15;(2):CD007146.
- Gray SL, Hart LA, Perera S, Semla TP, Schmader KE, Hanlon JT. (2017) Meta-analysis of interventions to reduce adverse drug reactions in older adults. *Journal of the American Geriatrics Society* 66 (2): 282–288.
- Gurevitch J, Koricheva S, Nakagawa S, Steward G (2018). Meta-analysis and the science of research synthesis. *Nature* 555 (2018): 175-182.
- Harris C, Larry VH, Jeffrey CV. (2009) Formulating a problem, In: *The Handbook of Research Synthesis and Meta-Analysis*. 2nd Edition, Russell Sage Foundation, Newyork, USA, 20-35.
- Higgins JPT, Thompson SG, Deeks JJ, Altman DG. (2003) Measuring inconsistency in meta-analyses. *BMJ* 327(7414):557-60.
- Holvast F, Massoudi B, Oude Voshaar RC, Verhaak PF. (2018) Non-pharmacological treatment for depressed older patients in primary care: A systematic review and meta-analysis. *Plos One* 12(9): e0184666.
- Hunter JE & Schmidt FL. (2014). Introduction to Meta-analysis, In: *Methods of meta-analysis: Correcting Error and Bias in Research Findings*. 3rd Edition, Newbury Park, CA: Sage Publications, 1-3.
- Katerndahl DA & Cohen PA. (1987) Quantitatively reviewing the literature: the application of meta-analysis. *The Family Practice Research Journal* 6(3):123-129.
- Kojima G. (2018) Frailty as a predictor of nursing home placement among community dwelling older adults: A systematic review and meta-analysis. *Journal of Geriatric Physical Therapy* 41(1):42-48.
- Littell JH, Corcoran J, Pillai V. (2008) Formulating the Topic and Developing a Protocol, In: Tripodi T, Dallato P, Thyer B. (Editors.) *Systematic Reviews and Meta Analysis*. 1st Edition, OXFORD University Press, USA, 27-29.
- Mayo-Wilson E, Grant S, Burton J, Parsons A, Underhill K, Montgomery P. (2014). Preventive home visits for mortality, morbidity, and institutionalization in older adults: a systematic review and meta-analysis. *PLoS one* 2;9(3):e89257.
- Michael B, Larry VH, Julian PTH, Hannah RR. (2009) How a meta analysis work, In: *Introduction to meta analysis*. 1st Edition, John Wiley & Sons, New Jersey, ABD, 5-20.
- Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA, PRISMA-P Group. (2015) Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 4(1):1.
- Nelson SJ, Johnston WD, Humphreys BL. (2001) Relationships in medical subject headings (MeSH). In: Bean CA, Green R (Editors.) *Relationships in the Organization of Knowledge. Information Science and Knowledge Management*, 2nd Edition, Springer, Dordrecht, 171-172.
- Noel AC. *Methodology in social sciences*. (2012) In: *Applied meta-analysis for social science research*, David AK, Todd DL. (Editors.) 1st Edition, Guilford Publications, Newyork, USA, 15-30.
- Nguyen NH & Singh S. (2018) A primer on systematic reviews and meta-analysis. *Seminars in Liver Disease* 38(2):103-111.
- Petticrew M. (2015) Time to rethink the systematic review catechism? Moving from “what works” to “what happens.” *Systematic Reviews* 4 (1): 36.
- Shin S, Park JH, Heekim J. (2015). Effectiveness of patient simulation in nursing education: Meta-analysis. *Nurse Education Today* 35(1): 176-182.
- Stuck AE, Siu AL, Wieland GD, Rubenstein L, Adams J, 1993. *Comprehensive geriatric assessment: a meta-analysis of controlled trials*. *The Lancet* 342 (8878): 1032-1036.
- Stuck AE, Egger M, Hammer A, Minder CE, Beck JC, 2002. Home visits to prevent nursing home admission and functional decline in elderly people: systematic review and meta-regression analysis. *Jama* 287(8): 1022-1028.
- Terri DP. (2012) Planning a meta analysis in a systematic review, In: *Advances in meta analysis*. 1st Edition, Springer Science & Business Media, London, England, 13-16.
- Van Loveren & Aartman IH, 2007. The PICO Patient-Intervention-Comparison-Outcome) question. *Ned Tijdschr Tandheelkd*. 114(4):172-178.