ARTICLE

Analyses of Evidence for Hierarchy and Levels of Evidence: an Exploratory Quantitative Synthesis

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Abstract

Background: Among the recognized steps in EBP, evaluating and critically appraising research evidence on effectiveness of an intervention is an essential step that acts as a determinant in forming the link between obtained evidence and implementation in practice. **Objective:** To critically summarize and identify the results of analyses of levels of evidence published in journals indexed in PubMed. **Methods:** A systematic overview and quantitative analysis of selected 45 published reviews was performed to identify relevant themes in levels of evidence. The types of analyses (specialty-based, practice-based, journal-based, and conference-based) were categorized and sub-categorized for the studies on levels of evidence. **Results:** Of the 45 included studies, specialty-based analysis for levels of evidence were done in 12 articles, journal-based analysis in 5 articles, practice-based analysis in 25 articles, and conference-based analysis in 3 articles. Among the practice-based articles, 10 were on assessment and 15 were on treatment. Urology had more studies on analysis of levels of evidence, and very few studies analyzed journals and their content for the same. Three studies were analyses of conference abstracts, all of them in the field of orthopedics. **Conclusion:** There were greater number of studies on practice, in Urology, multiple journals, biomarkers in assessment, and equal representation of pharmacological and allied treatments. There is need for future reviews and analysis of levels of evidence in many unexplored areas of relevance.

Key words: Evidence analysis, Level of evidence, Critical appraisal, Study designs.

Introduction

The modern day healthcare is a complex social system with ever-increasing needs for specific updated knowledge and evaluation of research evidence and an ongoing implementation into interprofessional decision-making in clinical practice (1). The evolving paradigm of evidence-

based practice (EBP) to evidence-informed practice (EIP) has extended its reach into many biomedical fields such as medicine, physiotherapy, occupational therapy, nursing, psychology, and education (2). Among the recognized steps in EBP, evaluating and critically appraising research evidence on effectiveness of an intervention is an essential step that acts as a determinant in forming the link between obtained evidence and implementation in practice (3). The form and focus of EBP relies on the established and widely recognized fact upon the clinician's methods to increase the efficiency of EBP searches by using relevant formats (4). Safer and higher quality healthcare thus depend upon adequacy and applicability of research evidence, which moves along a continuum of knowledge-generation to knowledge-translation (5). However, to build EBP into the foundations of practice through administrative policies into education of healthcare professionals (6), it is essential to understand the existing evidence-base for the criteria of evaluating research evidence such as the levels of evidence. The levels of evidence provides a simple and objective evaluative criteria for critically appraising the research evidence, although it is subjective and should be integrated with other measures of internal validity and external validity of such studies (7). Appraising the levels of evidence was demonstrated to be a core component of EBP knowledge and skills, among healthcare professionals (8), and such a model of approach directly facilitates staff development in multidisciplinary shared/informed decision-making (9).
Thus there is a dearth need to evaluate the existing research evidence for levels of evidence through articles published in PubMed. We have therefore wished to critically summarize and identify the results of analyses of levels of evidence, published in journals indexed in PubMed.

Materials and Methods

Study design

A systematic overview and quantitative analysis of published reviews. The study methodology was a replication as per a previously reported study by Kumar et al (10). Two reviewers performed an independent blinded search of PubMed using specific search strategy and they independently extracted and synthesized the data from the selected studies using a structured checklist. At all stages of the review process, all disagreements were solved by mutual consensus before proceeding to the subsequent stages of the review.

Search strategy, selection criteria and Data extraction and synthesis:

A thorough literature search of PubMed using keywords ""levels of evidence"[Title] OR "hierarchy of evidence"[Title]" were used in the search tab, for obtaining all types of articles published in English, with available abstracts indexed until October 2012. The content of selected abstracts and full text articles was examined for their attributes of analysis of levels of evidence, as per the structured checklist.

Results

Our search yielded an initial list of 61 citations, and we excluded 16 studies since they were not analyzed (N=10) and were commentaries or editorials (N=6), and we selected a final list of 45 articles (11-55) included for our analysis. The 45 studies that were deemed eligible in the final scrutiny list were descriptively summarized as per themes identified in our scrutiny checklist as follows;

Types of analysis of levels of evidence

Four distinct types were identified- specialty-based analysis for levels of evidence was done in 12 articles, journal-based analysis in 5 articles, practice-based analysis in 25 articles, and conference-based analysis in 3 articles. The comparison for types of analysis is shown in figure 1.
There was a greater number of articles that performed practice-based analysis (N=25, 55%) of level of evidence compared to other types.

Specialty/ focus

A total of 11 specialties were represented and among them, Urology had 2 articles (23,34), and all other specialties such as Anesthesia (42), Foot and ankle surgery (13), Hand surgery (19), Medicine (28), Neurosurgery (11), Otolaryngology (41), Pediatric orthopedics (18), Plastic Surgery (31), Podiatric Medicine (54), and Thoracic surgery (45) had one article each. Their comparison is shown in figure 2.

Journal(s)

Three articles (27,38,48) were on analyses of levels of evidence in individual journals- and two (20,21) were on multiple journals. The individual journals were Journal of Bone and Joint Surgery- American (JBJS-A) (27,48), and International Journal of Oral and Maxillofacial Surgery (38). The comparison of number of articles between analyses of single journal versus multiple journals is shown in figure 3.

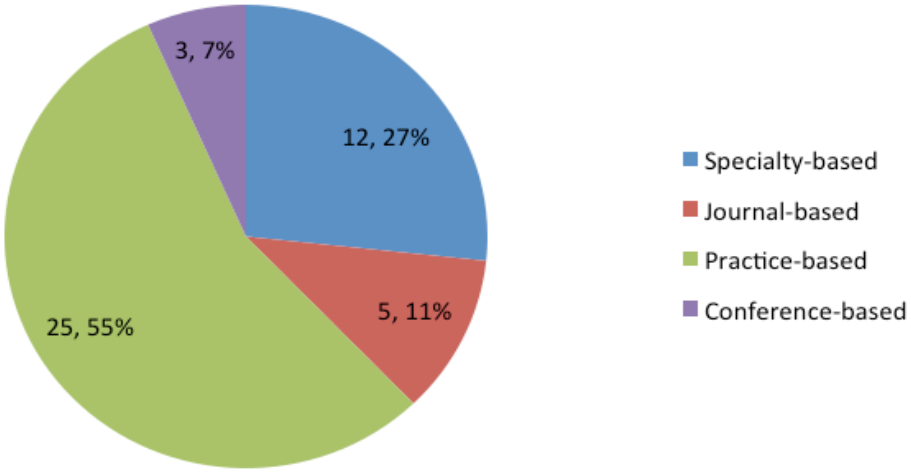

Figure 1. Comparison of number of articles based upon types of analysis

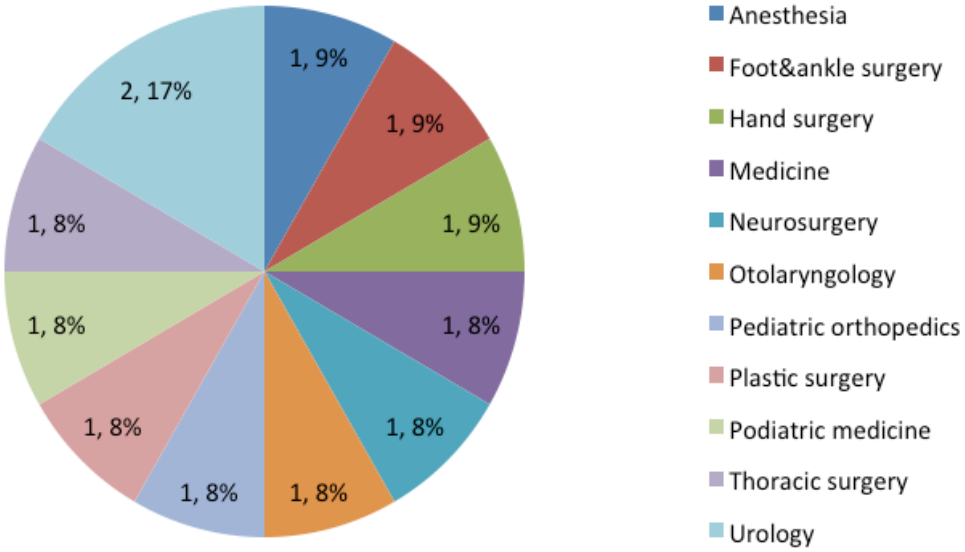

Figure 2. Comparison of number of articles based upon specialty-based analysis Journal(s)

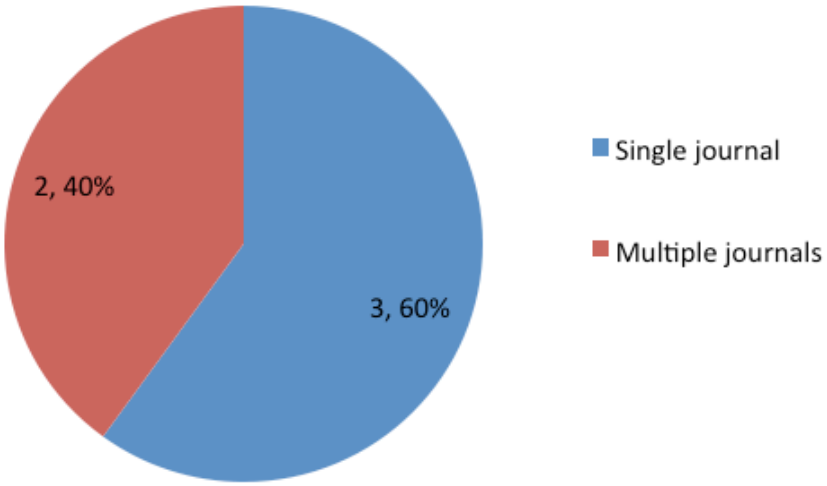

Figure 3. Comparison of number of articles based upon journal-based analysis

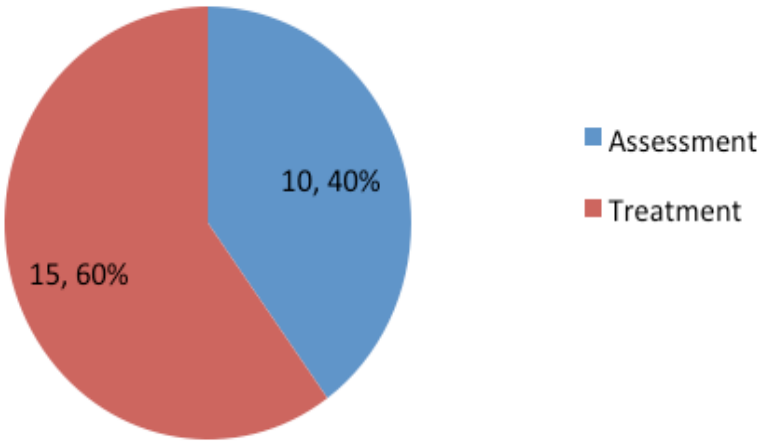

Figure 4. Comparison of number of articles based upon practice-based analysis

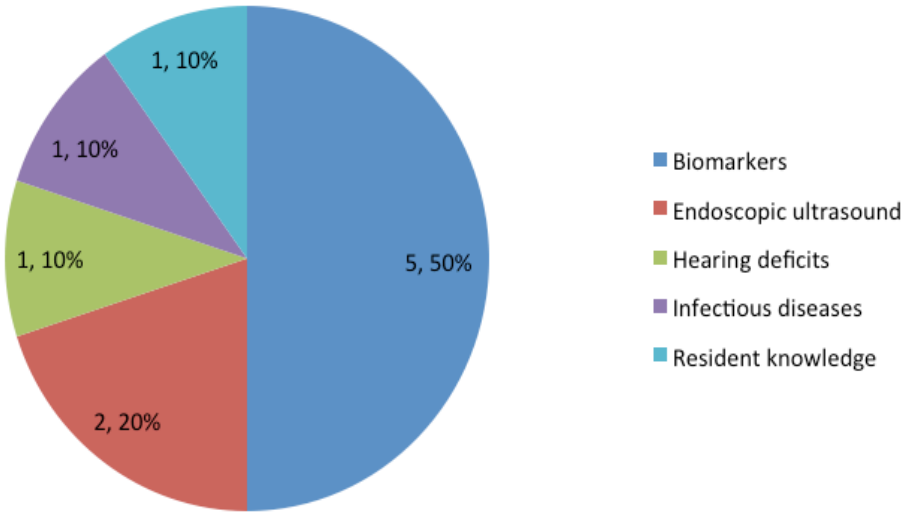

Figure 5. Comparison of number of studies based upon assessment

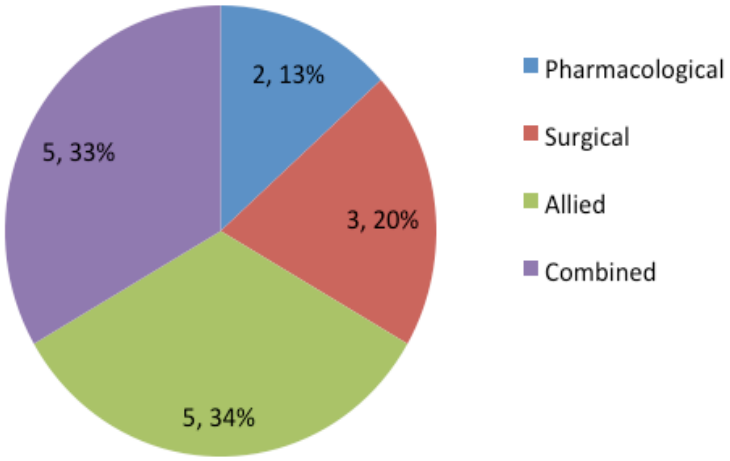

Figure 6. Comparison of number of studies based upon treatment

Practice

The 25 articles on practice-based analysis included 10 articles, which were on clinical/ laboratory Assessment (12,14,15,24,25,29,32,37,49,55) and 15 articles, which were on treatment (17,30,33,35,36,39,40,43,44,46,47,50, 51,52,53). The comparison between analysis of levels of evidence for assessment and treatment in practice is shown in figure 4. Of the 10 articles that were on analysis of levels of evidence for assessments, studies were on Biomarkers (14,24,29,32,37), Endoscopic ultrasound (12,15), Hearing deficits (49), Infectious diseases' outbreaks (55), and Residents' knowledge (25). The comparison between studies on analysis of levels of evidence for assessment is shown in figure 5. Of the 15 articles that were on treatment (17,30,33,35,36,39,40,43,44,46,47,50,51,52,53) , two studies were Pharmacological (30,33), three studies were on Surgical (36,46,47), five studies were on Allied (17,40,43,44,52), and five studies were on Combined (35,39,50,51,53) interventions. The comparison between studies on analysis of levels of evidence for treatment is shown in figure 6.

Conference proceedings

There were three studies (16,22,26) on analysis of conference abstracts of which all were from orthopedic conferences (16,22,26).

Discussion

The study aimed at exploring the reviews on levels of evidence studies, to quantitatively summarize for their thematic relevance and content analysis. This study found that there were greater number of studies on practice, in Urology, multiple journals, biomarkers in assessment, and equal representation of pharmacological and allied treatments. It was however understandable that analysis of evidence was practice-related, but these findings are overshadowed by the smaller sample size- the lesser number of studies on such analyses. This study evaluated PubMed since it is the most widely accepted fundamental evidence resource for clinical decision making. Search performed in other databases would have covered many other articles of similar relevance and merit. The study was primarily aimed at providing an overview, and we anticipated that at the end of this exploratory analysis, future studies could be suggested and conducted upon. In this context, there is need for future studies on analysis of level of evidence in many other specialties and subspecialties of Medicine such as sports medicine, palliative care, pain, cancer or oncology, nursing and so on. Also there is necessity for quality rating of such systematic reviews and thereby arriving at better publishing policies and guidelines for reporting amongst journals. Journals, which play a major leadership role in a country or region are also to be scrutinized for the levels of evidence in their published articles, so that appropriate policy changes are brought about. Most of the studies utilized Center for evidence based medicine (CEBM) levels of evidence, and so do the Cochrane collaboration (56); however the authors are aware that many more methods of quality rating and categorization of study designs into levels of evidence are available to date. Future studies on inter-rater reliability of evidence grading are essential, and also is the need for research on training programs in evidence-based practice. The presence of evidence analysis for conference abstracts is worthwhile and has opened a new era of scientific inspiration and had thrown light on the importance of conference proceedings as evidence, though they are usually graded as level-5 in CEBM levels of evidence. This study is the first of its kind and it provided a platform and a benchmark for future studies on analysis of levels of evidence, and also established a strong informational knowledge on the characteristics and content of such articles. Using an analytical approach to such studies is beyond the scope of this study. The clinicians and researchers are hereby informed to be cautious when they are interpreting the results of this study since it utilized a descriptive approach in an attempt to qualitatively evaluate the studies on analysis of levels of evidence and hence no recommendations can be made at this stage. As Rice (57) opined, *"Regardless of the level of evidence, clinicians must discuss the recommended intervention, risks, benefits, and alternatives to achieve the best EBP outcome."*

The levels of evidence not only provide an effective tool for interprofessional communication in healthcare decision-making but also provide foundation for grading recommendations for effective practice (58), and for use in clinical practice guidelines. Readers are requested to refer to elsewhere for a detailed description of such guidelines (59).

In conclusion this study found that there were greater number of studies on practice, in Urology, multiple journals, biomarkers in assessment, and equal representation of pharmacological and allied treatments. There is need for future reviews and analysis of levels of evidence in many unexplored areas of relevance.

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