

A Meta-Analytic Study of the Effectiveness of Clinical Decision-Making Interventions Among Medical Professionals

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Introduction

There are many needs in the medical field. This study investigates one of the more prominent issues in the medical field – diagnostic errors. Diagnostic errors, defined as delayed diagnosis, a wrong diagnosis, or a missed diagnosis altogether, have become one of the largest categories of medical malpractice high severity claims (Graber et al., 2005). These researchers also noted that it is considered one of the most important patient safety hazards and unfortunately causes the most harm.

Depending on the disease or disorder, accurate diagnosing can prove to be difficult. Inaccurate diagnoses have many consequences. Apart from the obvious consequences like the persistence and aggravation of diseases and the potential degeneration of the patient's mental health, this could also lead to other potential adverse effects in the patient. Additionally, this would negatively impact doctor-patient relationships. Therefore, clinical decision-making interventions are justified and needed in the medical field.

Objective: investigate ways the diagnostic skills of medical professionals can be improved. We hypothesized that Clinical Decision-Making (CDM) interventions are likely to increase the rate of accurate diagnoses among medical health professionals.

Method

Study Variables: Our original interest revolved specifically around interventions aimed to improve mental health diagnoses. However, the results of a scoping review led us to broaden our search to medical interventions for any ailment. We also extended our population to include any medical personal, both trainees and practicing professionals.

Study Selection: Our literature search for relevant studies was conducted using the databases ProQuest Central, Worldcat, Education Database, ERIC, JSTOR Arts and Sciences Collection I-V, Medline, PsychArticles, ScienceDirect, and Social Science Database. Our search terms were as follows: [su:(physician diagnosis) AND ti:(training OR workshop OR education OR expertise OR experience) AND ti:(diagnosis OR diagnostic) (eu:Peerreviewed)]. Once results were obtained, they were deduplicated manually. Abstracts were screened. Inclusion criteria were: (1) participants were either medical personnel or medical trainees, (2) study utilized an intervention with the focus of improving diagnostic practices/precision (3) study contained a comparison group (4) results included effect sizes reflecting a measure of diagnosing practices, and (5) studies were peer reviewed and in English as seen in Figure 1. Full text reviews were then conducted using the same inclusion criteria.

Data Extraction: Effect sizes were pulled from the articles indicating either an increase in diagnostic knowledge or diagnostic specificity.

Analysis: Meta-analyses were conducted using a random-effects model. Significance was assessed at $p < .05$.

Results

Study Characteristics: Search of ProQuest Central, Worldcat, Education Database, ERIC, JSTOR Arts and Sciences Collection I-V, Medline, Psych Articles. Science Direct, Social Science Database resulted in 103 records. After the removal of duplicates and application of selection criteria, 6 independent studies were included for our meta-analysis. Of the 6 studies, five reported on the effect of CDM interventions and an increased rate of accurate diagnoses while one reported on knowledge enhancement as a result of a CDM intervention.

Results from the Random effects model suggest that Clinical Decision-Making Interventions have a small effect size but are related to improved diagnostic skills and accuracy, $p=0.049$, $Q(5) = 9.08$ (ns), I-squared = 44.9. Included In this study, among the health care professional sample were general practitioners, family, and primary care physicians and rheumatologists. Among the sample of patients were patients with insomnia, osteoporosis, Otitis media, suspicious skin lesions, depression, and skin cancer. The aggregate sample size across these studies was $N=1,190$.

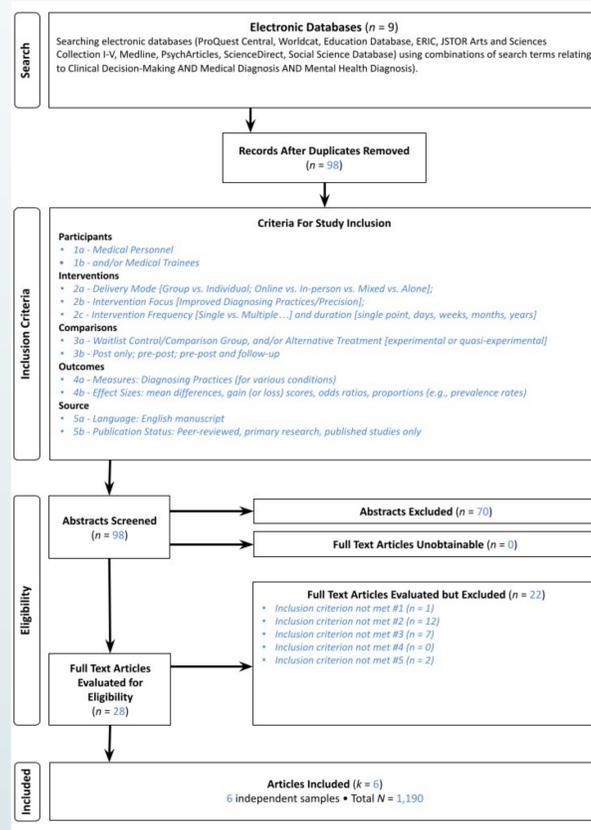
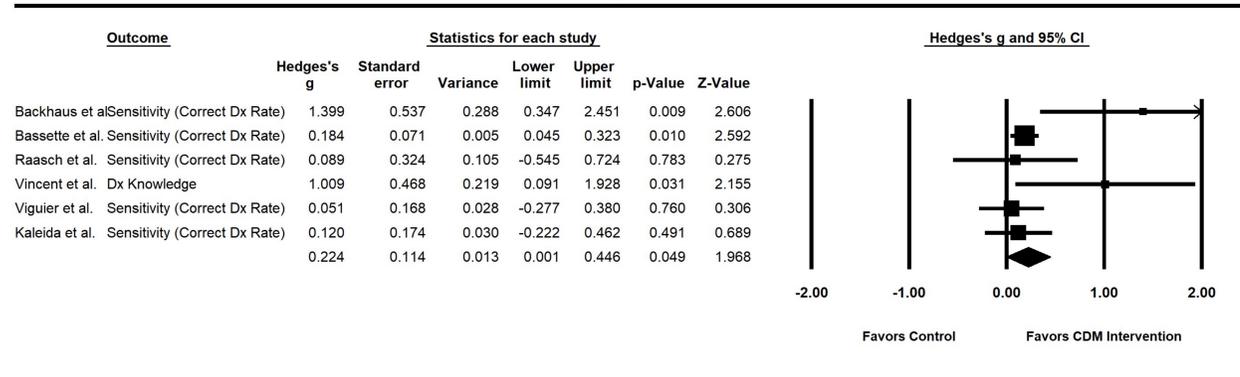


Figure 1: This is the PICO framework for this study. It allowed us build a set of exclusion criteria to screen several sources. As depicted in the figure, we were left with 6 sources that met all the requirements and parameters of our study.

Clinical Decision-Making Intervention Effectiveness



Random-effects Model >> Test for overall effect: $G = .224$ (~small), $Z = 1.968$ ($p = .049$); Tests of Heterogeneity: $Q(5) = 9.08$ (ns); I-squared = 44.9

Figure 2 Results from the Random Effects Model: There is a small, statistically significant positive effect between clinical decision-making interventions and diagnostic accuracy.

Discussion

This meta-analysis is meant to serve as a pilot study to encourage future research on this topic. Our results show that an initial sample of interventions do have a positive effect on increasing diagnostic accuracy in medical professionals. This research is important because of the prevalence and dangers of diagnostic errors in our health care systems. Such errors can lead to the persistence and aggravation of diseases and potentially other adverse symptoms in the patient. Another area that is impacted by diagnostic error is maintenance of trust between doctors and patients. It is unfortunate that this could hinder patients from seeking help when they need it. For example, this becomes extremely important in mental health systems as the stigma around seeking mental health care is already a large roadblock to treatment for afflicted individuals (Corrigan, 2004).

Our results indicate that these CDM interventions show positive effects in increased diagnostic ability in areas of knowledge and sensitivity. Thus, health care treatment and education facilities should seek to incorporate such interventions for their employees and students.

Further research is needed to broaden the scope of this meta-analysis, such as including an open-call to data to overcome potential publication bias. Additionally, a more rigorous analysis of the quality of the present studies is needed. Further research on different types of interventions is also needed, particularly within the field of mental health.

Conclusion

Diagnostic errors pose a grave danger in our healthcare systems. These errors have several consequences such as disease persistence and aggravation and the deterioration of the patient's health. Another area that could be impacted is trust within doctor-patient relationships.

This study has outlined the importance of Clinical Decision-Making interventions. It also provides evidence for the effect of Clinical Decision-Making Intervention on improved diagnostic accuracy by increasing knowledge and sensitivity among medical workers and trainees. Thus, more interventions should be developed and tested in order to improve the quality of care in our health care systems and quality patient-provider relationships.

Sources

Backhaus, J., Junghanns, K., Mueller-popkes, K., Broocks, A., Riemann, D., Hajak, G., & Hohagen, F. (2002). Short-term training increases diagnostic and treatment rate for insomnia in general practice. *European Archives of Psychiatry and Clinical Neuroscience*, 252(3), 99-104. <https://doi.org/10.1007/s00406-002-0361-x>

Bessette, L., Davison, K. S., Jean, S., Roy, S., Ste-marie, L. G., & Brown, J. P. (2011). The impact of two educational interventions on osteoporosis diagnosis and treatment after fragility fracture: A population-based randomized controlled trial. *Osteoporosis International*, 22(12), 2963-2972. <https://doi.org/10.1007/s00198-011-1533-1>

Corrigan, P. (2004). How stigma interferes with mental health care. *American Psychologist*, 59(7), 614-625. <https://doi.org/10.1037/0003-066X.59.7.614>

Graber, M. L., Franklin, N., & Gordon, R. (2005). Diagnostic error in internal medicine. *Archives of Internal Medicine*, 165(13), 1493. <https://doi.org/10.1001/archinte.165.13.1493>

Kaleida, P. H., Ploof, D. L., Kurs-lasky, M., Shaikh, N., Colborn, D. K., Haralam, M. A., Ray, S., Kearney, D., Paradise, J. L., & Hoberman, A. (2009). Mastering diagnostic skills: Enhancing proficiency in otitis media, a model for diagnostic skills training. *Pediatrics*, 124(4), e714-e720. <https://doi.org/10.1542/peds.2008-2838>

Raasch, B. A., Hays, R., & Buettner, P. G. (2000). An educational intervention to improve diagnosis and management of suspicious skin lesions. *Journal of Continuing Education in the Health Professions*, 20(1), 39-51. <https://doi.org/10.1002/chp.1340200108>

Vicente, B., Kohn, R., Levav, I., Espejo, F., Saldivia, S., & Sartorius, N. (2007). Training primary care physicians in Chile in the diagnosis and treatment of depression. *Journal of Affective Disorders*, 98(1-2), 121-127. <https://doi.org/10.1016/j.jad.2006.07.006>

Viguier, M., Rist, S., Aubin, F., Leccia, M.-T., Richard, M.-A., Esposito-farèse, M., Gaudin, P., Pham, T., Richette, P., Wendling, D., Sibilia, J., & Tubach, F. (2015). Online training on skin cancer diagnosis in rheumatologists: Results from a nationwide randomized web-based survey. *PLOS ONE*, 10(5), e0127564. <https://doi.org/10.1371/journal.pone.0127564>