Evidence-based practice in radiology: Knowledge, attitude and perceived barriers to practice among residents in radiology

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ABSTRACT

Aim: We examinted the attitude, knowledge and perceived barriers to evidence-based practice of radiology (EBPR) among residents in radiology.

Study design and setting: We used the McColl questionnaire (1) and the BARRIERS scale (2) to assess the issues among radiology trainees attending an annual refresher course. Ninety six residents from 32 medical colleges from Southern India attended the course.

Results: Eighty (83.3%) residents, 55 male and 25 female of age range 24–34 years, consented and returned the questionnaire. The majority of the participants had a positive attitude towards EBPR. However, 45% were unaware of sources for evidence based literature although many had access to Medline (45%) and the internet (80%). The majority (70%) were aware of the common technical terms (e.g. odds ratio, absolute and relative risk) but other complex details (e.g. meta-analysis, clinical effectiveness, confidence interval, publication bias and number needed to treat) were poorly understood. Though majority of residents (59%) were currently following guidelines and protocols laid by colleagues within their departments, 70% of residents were interested in learning the skills of EBPR and were willing to appraise primary literature or systematic reviews by themselves. Insufficient time on the job to implement new ideas (70.1%); relevant literature is not being complied in one place (68.9%); not being able to understand statistical methods (68.5%) were considered to be the major barriers to EBPR. Training in critical appraisal significantly influence usage of bibliographic databases ($p < 0.0001$).

Attitude of colleagues ($p = 0.006$) influenced attitude of the trainees towards EBPR. Those with higher knowledge scores ($p = 0.02$) and a greater awareness of sources for seeking evidence based literature ($p = 0.05$) held stronger beliefs that EBPR significantly improved patient care.

Conclusions: The large knowledge gap related to EBPR suggests the need to incorporate structured training into the core-curriculum of training programmes in radiology.

1. Introduction

Evidence-based-practice in radiology (EBPR) is integration of best available research evidence into radiological practice. This includes issues related to technology, clinical radiology and clinical medicine [3]. Radiology is a rapidly evolving discipline and there are ever increasing technological advancements. Radiologists are often put into a situation where they are asked to choose the best imaging suitable for the patient, taking into account the various patient context and the clinical question. Similarly interventional radiology procedures are alternative or an important adjuncts to complex surgical procedures. Clinical colleagues look to radiologists for the highest quality advice and this should ideally be evidence-based. Thus, easy availability of evidence, being able to formulate an answerable question, training and skills in search stategies, critical appraisal of literature, and correlating the clinical context and issues with the evidence are all very important for good radiology practice [4–12]. We carried out this study to find knowledge, attitude and perceievd barriers to EBPR among residents in Southern India.

2. Methodology

This was an IRB approved study conducted at Department of Radiology, Christian Medical College, Vellore, India, a 3000-bedded tertiary care teaching hospital in South India. The McColl

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questionnaire (1) was first designed and used to understand the attitude and knowledge towards evidence based medicine as perceived by the general practitioners. Similarly, the BARRIERS scale (2) was first designed to find the perceived barriers in practicing evidence based medicine among nurses. These questionnaires have later been used in diverse settings [13–16]. The McColl questionnaire (1) and the BARRIERS scale (2) used were slightly modified in order to make it relevant to radiology. The questionnaires were administered to all the residents attending the radiology refresher course for final year radiology residents. Ninety six residents from 32 different medical colleges in Southern India attended the course. Informed consent was obtained from all the participants and the questionnaires was filled and returned anonymously.

Attitude towards EBPR was assessed with a visual analog score. Knowledge score was obtained by assessing knowledge of various technical terms used in evidence-based medicine as given in the McColl questionnaire. A score of one was given for each correct answer to technical terms and the sum of the scores used to derive a knowledge score. Maximum knowledge score possible was twelve. The barrier score was obtained as recommended by Funk et al. [2]. Details of prior medical and radiological training, medical practice, details of training institutions and socio-demographic details were also collected.

3. Statistical analysis

Statistical analysis was performed using IBM SPSS Analytics 16.0 software (Chicago, Ill., USA). Bivariate correlation analysis was done to study relationship between attitude, knowledge and perceived barriers. To assess factors contributing to differences in attitude, knowledge and perceived barriers towards EBPR, chi-squared (χ^2) test were performed to analyze categorical data; independent sample t-test was performed to analyze continuous data. Multiple linear regression analysis was used identify the most significant factors that contributed to such differences and to adjust for the influence of common confounders (e.g. age, sex).

4. Results

Out of 96 radiology residents who attended the course, 80 (83.3%) took part in the study. The differences between those who took part in the study and those who refused were not statistically significant on the following variables: age, sex, and type of educational institution.

Fifty five males and 25 females with a average age of 28.7 years (SD ± 2.3; range of 24–34 years) participated in the study. 20 (22.7%) residents were working towards the Diploma; 37 (42%) towards their MD (Doctor of Medicine) and 31 (35.2%) were doing DNB degree (Diplomate in National Board) (which is essentially equivalent to the MD). They had an average of 5.4 years (SD 2.3; range of 2–11) experience after their MBBS degree. Forty residents studied in government colleges while 40 were from private medical colleges. 10 (12.5%) residents had publications in radiology journals (range 1–3).

4.1. Knowledge of technical terms used in evidence based literature

Median knowledge score obtained was seven, 37 (46.3%) trainee got a knowledge score of greater than or equal to seven and displayed better attitude towards EBPR. Odd ratio, absolute and relative risk was the only terms which were understood by more than 70% of residents. Others terms like meta-analysis, clinical effectiveness, confidence interval, publication bias and number needed to treat were poorly understood.

The following factors were significantly associated with high knowledge score: publications ($\chi^2 = 9.463$, df = 1, $p = 0.024$); access to Medline at workplace ($\chi^2 = 4.665$, df = 1, $p = 0.027$) and library ($\chi^2 = 6.302$, df = 1, $p = 0.011$); attitude towards EBPR (t value = -4.384, df = 73.12, $p = 0.000$). The following factors showed a trend toward high knowledge score: use of evidence based protocols developed by colleagues ($\chi^2 = 3.009$, df = 1, $p = 0.068$); access to World Wide Web in the library ($\chi^2 = 2.767$, df = 1, $p = 0.078$) and number of times Medline was accessed in a year (t value = -1.776, df = 22.7, $p = 0.089$). Table 1 shows the results of multivariate regression analysis. Regression analysis showed a significant association between knowledge score and access to Medline or other bibliographic database ($B = 2.603$, SE = 0.682, $p = 0.000$) and awareness of sources of EBM ($B = -2.03$, SE = 0.630, $p = 0.002$).

4.2. Attitude towards EBPR

Attitude of the residents towards EBPR is shown in Table 2. The following factors were significantly associated with welcoming attitude towards EBPR: male sex (t value = -1.952, df = 77, $p = 0.055$), residents from private college (t value = 2.551, df = 57, $p = 0.013$), favorable attitude of colleagues towards EBPR (t value = 4.298, df = 78, $p = 0.000$), those with access to World Wide Web (t value = 18.845, df = 78, $p = 0.000$) and Medline (t value = 18.837, df = 78, p value = 0.000) and high knowledge score (t value = 17.949, df = 78, p value = 0.000). The most significant contributors to the attitude of the residents on multivariate regression analysis were attitude of their colleagues ($B = 0.343$, SE = 0.108, $p = 0.002$), use of evidence based protocols laid down by colleagues ($B = 13.237$, SE = 6.172, $p = 0.036$) and the knowledge score ($B = 1.989$, SE = 0.943, $p = 0.039$).

There was stronger belief that research findings would be useful for day-to-day management of patients among residents with high knowledge score (t value = 23.611, df = 78, $p = 0.000$), awareness of sources for seeking evidence based literature (t value = 25.457, df = 78, $p = 0.000$), those residents who believed that practice of EBPR would improve patient care (t value = -3.621, df = 78, $p = 0.001$) and those with access to Medline (t value = 24.62, df = 74, $p = 0.000$). Irrespective of the degree of awareness of sources for seeking evidence-based literature, there was high degree of agreement that EBPR would improve patient care with mean (SD) score of 78.1 (21.4). There was good correlation between the attitude of residents and the attitude of their colleagues towards EBM ($r = 0.484$, $p < 0.001$). But colleagues were perceived to have less welcoming attitude towards EBPR than one-self (t value = 4.298, df = 78, $p = 0.000$).

4.3. Practice trends among radiology residents

4.3.1. Accessing the evidence

Medline or another bibliographic database was used for literature search on an average of 114.3 ($\pm$271) times in one year. The last search that influenced their practice was done 1 week to 1 month ago by 56.3% of residents and 14.5% of residents have never done a search, $n = 55$. Only 11 (13.8%) residents have received formal training in search strategy; 4 (5%) residents received formal training in critical appraisal and 9 (11.4%) residents have attended courses related to evidence based medicine. 13 (16.3%) did not have access to Medline and 9 (11.3%) did not have access to World Wide Web. Others had access to Medline and World Wide Web either at home, work place or library. Access to Medline was available at workplace for 36 (45%) and World Wide Web was available at work place for 64 (80%) of participants. Multivariate regression analysis showed that training in critical appraisal ($B = 549.8$, SE = 124.5, $p = 0.000$) and prior experience in scientific writing ($B = 133.3$, SE = 48.12,