



MEDICAL EDUCATION

Journal clubs – knowledge sufficient for critical appraisal of the literature?

Paul Rheeder, Danie van Zyl, Elize Webb, Zeleke Worku

Sir James Paget, reflecting on his experiences at St Bartholomew's Hospital in London during 1835 - 1854, noted: 'Some of the self-select of the pupils, making themselves into a kind of club, had a small room over a baker's shop near the Hospital's gate where we could sit and read the journals'.^{1,2} Sir William Osler started his journal club at McGill University, Montreal, more than 100 years ago in 1875.³

Journal clubs operate in all health science faculties in South Africa. They provide a unique opportunity not only to highlight the latest research but also to teach the principles and practice of evidence-based medicine. Critical appraisal of the literature requires the reader to be familiar with the rules of validity as well as the interpretation of research results. The three historical goals¹ of a journal club should be to 'keep up' with the literature, to improve clinical practice, and to promote critical reading skills.

This latter goal is the challenge facing most journal clubs today. This goal implies that senior staff involved in journal clubs should have a minimum core understanding of the principles of research, epidemiology and biostatistics.

In a survey of emergency medicine residency programmes in the USA,⁴ respondents felt that a median of 10 hours was required to teach evidence-based medicine adequately, but only 22% of programmes provided more than 5 hours of training per year.

The problem of a lack of understanding of statistical theory and study design by residents-in-training has also been highlighted. In a survey⁵ of 62 surgical residency programmes only 33% included formal statistics teaching in their curricula. The Department of Surgical Education, Orlando Regional

Medical Center, Florida consequently formulated a structured curriculum to introduce surgical residents to basic statistical theory, common statistical tests and study design. They integrated the lectures into an existing monthly journal club and showed that knowledge improved significantly following the new curriculum ($p < 0.004$).⁵

Likewise, when an educational programme to teach critical appraisal of the literature was introduced into an obstetrics and gynaecology journal club, knowledge scores improved significantly ($p = 0.003$).⁶

Various journal club formats exist, each with its relative merits. Often the purpose of a journal club is to provide an overview or update of the vast amounts of medical literature published over a certain time period. The pitfall then is that study design, statistical tests and the results are not critically appraised.

Journal Club evaluation

We evaluated four journal clubs from different clinical departments within the Faculty of Health Sciences at the University of Pretoria (61 respondents in total) using a standard questionnaire (Table I). The total scores varied from a median 12.5% for medical officers and 25% for first-year registrars, to 62.5% for consultants.

We also evaluated research articles in seven medical journals published between the periods July 2002 and June 2003 (*World Journal of Surgery*, *Journal of the American College of Surgery*, *International Journal of Obstetrics and Gynaecology*, *Archives of Diseases of Childhood*, *Annals of Internal Medicine*, *New England Journal of Medicine* and the *South African Medical Journal*) to determine the frequency with which various statistical tests were used in the medical literature. The results showed that analysis of variance varied between 4% and 19%, *t*-tests between 11% and 44%, Mann-Whitney tests between 5% and 23%, Kruskal-Wallis tests between 1% and 7%, categorical tests between 22% and 55%, Kaplan-Meier analyses between 0% and 27%, logistical regression analyses between 13% and 30%, and linear regression between 0% and 15% of all research articles reviewed in the various journals (983 articles reviewed).

A Journal Club curriculum

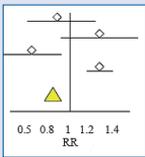
Clinical training requires the student to acquire skills in clinical assessment and therapy within a particular discipline. Unfortu-

Paul Rheeder is Professor in the Medihelp Chair of Clinical Epidemiology, University of Pretoria (UP). Danie van Zyl is a specialist physician and clinical epidemiologist from the Department of Internal Medicine, UP. Elize Webb is an epidemiologist from the School of Health Systems and Public Health (SHSPH), UP. Zeleke Worku is a statistician at the SHSPH. All are members of the Pretoria Clinical Epidemiology Unit of the International Clinical Epidemiology Network (INCLIN).

Corresponding author: Paul Rheeder (prheeder@medic.up.ac.za)



Table I. Evaluation of journal clubs

Questions (marks assigned to question)	% of totally correct answers in the four journal clubs
1. Name 3 criteria that you would use to judge the validity (absence of bias) of an INTERVENTION study (e.g. article in the <i>Lancet</i>) (3)	11, 0, 0, 0
2. Name 3 criteria that you would use to judge the validity of a DIAGNOSTIC study (e.g. article in the <i>Lancet</i>) (3)	0, 0, 0, 0
3. What is meant by 'an intention-to-treat analysis'? (1)	35, 11, 6, 0
4. What do you understand a <i>p</i> -value to mean? (1)	35, 11, 0, 0
5. What does the term 95% confidence interval mean? (1)	12, 0, 0, 0
6. Define a case control study (2)	6, 0, 6, 0
Characteristic of test A to predict disease B: sensitivity 78% and positive predictive value 86%	
7. Define sensitivity (1)	71, 78, 63, 32
8. Define positive predictive value (1)	24, 44, 31, 11
Aetiological study to determine if herpes virus is associated with cancer finds an odds ratio of 3.2	
9. Define odds ratio (1)	47, 22, 13, 11
Intervention study: drug A v. drug B for prevention of stroke shows 10/100 strokes in A and 20/100 strokes in B	
10. What is the relative risk reduction due to drug A? (1)	53, 22, 19, 16
11. What is the absolute risk reduction due to drug A? (1)	65, 56, 25, 16
12. What are the numbers needed to treat (NNT) to prevent 1 stroke? (1)	53, 33, 31, 42
Meta-analysis	
	
13. Which trial(s) shows a statistically significant result? (1)	53, 0, 19, 11
14. Name 3 criteria you would use to judge whether study results from a research paper on therapy could be applied in your setting (3)	12, 33, 13, 5
Total score (mean %)	42, 28, 25, 15

nately, however, it is not often realised that to read the medical literature in order to acquire said skills the student also needs more than a superficial knowledge of epidemiological concepts and core knowledge of data analyses used in medical research.

While journal clubs should provide a platform to review the latest literature, they should also have a clearly defined curriculum for teaching critical appraisal skills, including basic knowledge of epidemiology and biostatistics. This curriculum should include the various study designs used in medical research, rules of validity and applicability and basic biostatistics. Numerous textbooks (e.g. *Essential Evidence Based Medicine*⁷ and *Evidence-based Medicine: How to Practice and Teach*⁸) as well as websites (www.cebm.utoronto.ca/ and www.mebi.washington.edu/ebm-uwsom/index.html) can aid this process.

Reading of the research literature is seen as a vital tool in post-qualification continuing medical education. It stands to

reason therefore that investment in critical reading skills is essential if we as medical teachers want to ensure that our students continue with the most up-to-date diagnostic and therapeutic care of patients.

1. Linzer M. The journal club and medical education: over one hundred years of unrecorded history. *Postgrad Med J* 1987; 63: 475-478.
2. Paget S. *Memoirs and Letters of Sir James Paget*. London: Longmans, Green and Co., 1901: 42.
3. Cushing H. *The Life of Sir William Osler*. Vol. 1. Oxford: Oxford University Press, 1926: 132-133, 154.
4. Kuhn GJ, Wyer PC, Cordell WH, Rowe BH. Society for Academic Emergency Medicine Evidence-based Medicine Interest Group. A survey to determine the prevalence and characteristics of training in evidence-based medicine in emergency medicine residency programs. *J Emerg Med* 2005; 28: 353-359.
5. Cheatham ML. A structured curriculum for improved resident education in statistics. *Am Surg* 2000; 66: 585-588.
6. Khan S, Dwarakanath LS, Pakkal M, Brace V, Awonuga A. Postgraduate journal club as a means of promoting evidence based obstetrics and gynaecology. *J Obstet Gynaecol* 1999; 19: 231-234.
7. Mayer D. *Essential Evidence-based Medicine*. Cambridge: Cambridge University Press, 2004.
8. Strauss SE, Richardson WS, Glasziou P, Haynes RB. *Evidence-based Medicine: How to Practice and Teach*. Edinburgh: Elsevier, 2005.