Structured abstracts of original research and review articles

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In 1987 the Ad Hoc Working Group for Critical Appraisal of the Medical Literature,[1] under the leadership of Dr. R. Brian Haynes, McMaster University, Hamilton, Ont., proposed a system for making abstracts of clinical trials more informative. The thesis of this group was simply that a structured format would ensure that the authors could supply all the important information required by the reader to determine the clinical usefulness of the trial. Subsequently Mulrow, Thacker and Pugh[2] and Oxman and Guyatt[3] suggested a similarly structured format for abstracts of review articles. In 1990 I stated that we would publish the abstract in the structured format if the authors submitted it that way but that such a format was not mandatory.[4] Our thinking was based on our belief that all the information suggested by the ad hoc group was essential but that the headings, which seemed unnecessarily cumbersome, were not.

Now Haynes and colleagues[5] have joined forces to reconsider the structured abstract of clinical research and review articles and have proposed revised guidelines. They emphasize that the structured abstract should be prepared by the authors before the manuscript is peer reviewed, to ensure that it accurately reflects the article's contents. They also point out that since the proposal for structured abstracts was published the International Committee of Medical Journal Editors[6] has refined its guidelines on statistical reporting; hence, some slight changes must be made to the guidelines for the structured abstract.

Although we still believe that the abstract could be written in prose, we are convinced that we can assure more informative abstracts by demanding that the authors rigorously follow the structured format. Therefore, beginning with the first issue in 1991 *CMAJ* will routinely use the structured format for abstracts of all original research and review articles; the "Instructions for authors" to be published in that issue will reflect this change. In preparation we are asking authors to prepare a structured abstract when they revise their manuscripts. The following instructions are reprinted, after modest editing, with permission from the *Annals of Internal Medicine*.[5]

Detailed instructions for preparing structured abstracts for articles reporting original data from clinical investigations with human subjects

These instructions replace those originally published in the *Annals of Internal Medicine*.[1]

Authors submitting manuscripts reporting the results of clinical investigations should prepare an abstract of no more than 250 words under the following headings: Objective, Design, Setting, Patients (or Participants), Interventions (if any), Main outcome measure(s), Main results, and Conclusions. The content following each heading should be as follows.

Objective

The abstract should begin with a clear statement of the precise objective or question addressed in the report. If more than one objective is addressed, the main objectives should be indicated and only key secondary objectives stated. If an *a priori* hypothesis was tested it should be stated.

Design

The basic design of the study should be described. The duration of follow-up, if any, should be

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stated. As many of the following terms as apply should be used.

Intervention studies: randomized controlled trial; nonrandomized controlled trial; double-blind; placebo control; crossover trial; before–after trial.

For studies of screening and diagnostic tests: criterion standard (i.e., a widely accepted standard with which a new or alternative test is being compared; this term is preferred to "gold standard"); blinded or masked comparison.

For studies of prognosis: inception cohort (subjects assembled at a similar and early time in the course of the disorder and followed thereafter); cohort (subjects followed forward in time but not necessarily from a common starting point); validation cohort or validation sample if the study involves the modelling of clinical predictions.

For studies of causation: randomized controlled trial; cohort; case–control; survey (preferred to "cross-sectional study").

For descriptions of the clinical features of medical disorders: survey; case series.

For studies that include a formal economic evaluation: cost-effectiveness analysis; cost–utility analysis; cost–benefit analysis. For new analyses of existing data sets the data set should be named and the basic study design disclosed.

Setting

To assist readers to determine the applicability of the report to their own clinical circumstances the study setting(s) should be described. Of particular importance is whether the setting is the general community, a primary care or referral centre, a private or institutional practice, ambulatory or hospital care.

Patients (or Participants)

The clinical disorders, important eligibility criteria and key sociodemographic features of patients should be stated. The numbers of participants and how they were selected should be provided (see next paragraph), including the number of otherwise eligible subjects who were approached but refused. If matching is used for comparison groups, the characteristics that were matched should be specified. In follow-up studies the proportion of participants who completed the study must be indicated. In intervention studies the number of patients withdrawn for adverse effects should be given.

For selection procedures these terms should be used, if appropriate: random sample (where "random" refers to a formal, randomized selection in which all eligible subjects have a fixed and usually equal chance of selection); population-based sample; referred sample; consecutive sample; volunteer sample; convenience sample. These terms assist the reader to determine an important element of the generalizability of the study. They also supplement (rather than duplicate) the terms used by professional indexers when articles are entered into computerized databases.

Interventions

The essential features of any interventions should be described, including their method and duration of administration. The intervention should be named by its commonest clinical name (for example, the generic term "chlorthalidone"). Common synonyms should be given as well to facilitate electronic textword searching. This would include the brand name of a drug if a specific product was studied.

Main outcome measure(s)

The primary study outcome measurement(s) should be indicated as planned before data collection began. If the paper does not emphasize the main planned outcomes of a study this fact should be stated and the reason indicated. If the hypothesis being reported was formulated during or after data collection this information should be clearly stated.

Main results

The main results of the study should be given. Measurements that require explanation for the expected audience of the article should be defined. Important measurements not included in the presentation of results should be declared. As relevant, it should be indicated whether observers were blinded to patient groups, particularly for subjective measurements. Because of the current limitations of retrieval from electronic databases, results must be given in a narrative or point form rather than tabular form if the abstract is to appear in computerized literature services such as MEDLINE. If possible, the results should be accompanied by confidence intervals (for example, 95%) and the exact level of statistical significance. For comparative studies confidence intervals should relate to the differences between groups. For nonsignificant differences in the major study outcome measure(s) the clinically important difference sought should be stated and the confidence interval for the difference between the groups be given. When risk changes or effect sizes are given, absolute values should be indicated so that the reader can determine the absolute as well as relative impact of the finding. Approaches such as "number needed to treat" to achieve a unit of

benefit are encouraged when appropriate; reporting of relative differences alone is usually inappropriate. If appropriate, studies of screening and diagnostic tests should use the terms sensitivity, specificity and likelihood ratio. If predictive values or accuracy is given, prevalence or pretest likelihood should be given as well. No data should be reported in the abstract that do not appear in the rest of the article.

Conclusions

Only those conclusions of the study that are directly supported by the evidence reported should be given, along with their clinical application (avoiding speculation and overgeneralization) and an indication of whether additional study is required before the information should be used in usual clinical settings. Equal emphasis must be given to positive and negative findings of equal scientific merit.

For quick and selective scanning, the headings outlined above should be included in the abstract. For brevity, parts of the abstract can be written in phrases rather than complete sentences. (For example: "Design. Double-blind randomized trial", rather than "Design. The study was conducted as a double-blind, randomized trial".) This technique may make reading less smooth but facilitates selective scanning and allows more information to be conveyed per unit of space.

Detailed instructions for preparing structured abstracts for review articles (including meta-analyses)

Authors submitting manuscripts of review articles and articles reporting the results of meta-analyses should prepare an abstract of no more than 250 words under the following headings: Objective, Data sources, Study selection, Data extraction, Data synthesis, and Conclusions. The content following each heading should be as follows.

Objective

The abstract should begin with a precise statement of the primary objective of the review. The focus of this statement should be guided by whether the review emphasizes factors such as cause, diagnosis, prognosis, therapy or prevention. It should include information about the specific population, intervention or exposure, and test or outcome that is being reviewed.

Data sources

A succinct summary of data sources should be given, including any time restrictions. Potential sources include experts or research institutions active in the field, computerized databases and published indexes, registries, abstract booklets, conference proceedings, references identified from bibliographies of pertinent articles and books, and companies or manufacturers of tests or agents being reviewed. If a bibliographic database is used the exact indexing terms chosen for article retrieval should be stated, including any constraints (for example, English language or human).

Study selection

The abstract should describe the criteria used to select studies for detailed review from among studies identified as relevant to the topic. Details of selection should include particular populations, interventions, outcomes or designs. The method used to apply these criteria should be specified; for example, blind review, consensus or multiple reviewers. The proportion of initially identified studies that met the selection criteria should be stated.

Data extraction

Guidelines used for abstracting data and assessing data quality and validity (such as criteria for causal inference) should be described. The method by which the guidelines were applied should be stated; for example, independent extraction by multiple observers.

Data synthesis

The main results of the review, whether qualitative or quantitative, should be stated. Methods used to obtain these results should be outlined. Meta-analyses should state the major outcomes that were pooled and should include odds ratios or effect sizes and, if possible, sensitivity analyses. Numerical results should be accompanied by confidence intervals, if applicable, and exact levels of statistical significance. Evaluations of screening and diagnostic tests should address issues of sensitivity, specificity, likelihood ratios, receiver operating characteristic curves and predictive values. Assessments of prognosis could include summaries of survival characteristics and related variables. Major identified sources of variation between studies should be stated, including, for example, differences in treatment protocols, co-interventions, confounders, outcome measures, length of follow-up and dropout rates.

Conclusions

The conclusions and their applications should

be clearly stated, limiting generalization to the domain of the review. The need for new studies may be suggested.

References

1. Ad Hoc Working Group for Critical Appraisal of the Medical Literature: A proposal for more informative abstracts of clinical articles. *Ann Intern Med* 1987; 106: 598-604
2. Mulrow CD, Thacker SB, Pugh JA: A proposal for more informative abstracts of review articles. *Ann Intern Med* 1988; 108: 613-615
3. Oxman AD, Guyatt GH: Guidelines for reading literature reviews. *Can Med Assoc J* 1988; 138: 697-703
4. Squires BP: Structured abstracts; Résumés normalisés. *Can Med Assoc J* 1990; 142: 703
5. Haynes RB, Mulrow CD, Huth EJ et al: More informative abstracts revisited. *Ann Intern Med* 1990; 113: 69-76
6. International Committee of Medical Journal Editors: Uniform requirements for manuscripts submitted to biomedical journals. *Can Med Assoc J* 1988; 138: 321-328

Conferences

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Le 15-16 nov. 1990: Colloque international — Biotechnologies et environnement: Gérer les risques
Hôtel Delta Montréal
Mme. Denyse Pronovost, Centre de recherche en évaluation sociale des technologies, Université du Québec à Montréal, CP 8888, succursale A, Montréal, PQ H3C 3P8; (514) 987-7944, télécopieur (514) 987-4166

Nov. 22-23, 1990: Dual Disorders Conference '90 — Substance Abuse and Mental Disorders: Hands-on Treatment Strategies (sponsored by the Ontario Ministry of Community and Social Services, Toronto area)
Queen Street Mental Health Centre, Toronto
Nancy MacKay, Addiction and Rehabilitation Department, Salvation Army, 496 Richmond St. W, Toronto, Ont. M5V 1Y2; (416) 366-6521

Nov. 23, 1990: 8th Annual Practitioners Clinic Day — Clinical Geriatrics for the Practitioner
Mount Sinai Hospital, Toronto
Sybil Gilinsky, Education Department, Baycrest Centre for Geriatric Care, 3560 Bathurst St., North York, Ont. M6A 2E1; (416) 789-5131, ext. 2365

Nov. 23-24, 1990: Canadian Bioethics Society 2nd Annual Meeting — Autonomy, Donation and Sharing as Issues in Bioethics
Château Frontenac, Quebec City
Dr. Harry Grantham, Hôtel-Dieu de Québec, 11, côte du Palais, Quebec, PQ G1R 2J6; (418) 691-5075, FAX (418)691-5331

Nov. 28-30, 1990: Long-Term Care Forum (cosponsored by the Canadian Long Term Care Association and the Canadian College of Health Service Executives)
Holiday Inn, Toronto
Canadian Long Term Care Association, 302-260 St. Patrick St., Ottawa, Ont. K1N 5K5; (613) 237-9837, FAX (613) 237-6592

Nov. 29-30, 1990: 5th Annual Critical Care Spectrum
Royal York Hotel, Toronto
Robin Cushinan, Conference and Seminar Services, Humber College, 205 Humber College Blvd., Etobicoke, Ont. M9W 5L7, (416) 675-5077; or Gwen Villamere, chair, Continuing Education in Nursing, (416) 675-3111

Nov. 30, 1990: Violence Within the Therapeutic Milieu (Annual Clinical Day, Department of Psychiatry)
Toronto East General Hospital
Joan Edwards, Toronto East General Hospital, 825 Coxwell Ave., Toronto, Ont. M4C 3E7; (416) 469-6204

Dec. 1-2, 1990: Society of Toxicology of Canada 23rd Annual Symposium
Holiday Inn Crowne Plaza, Montreal
Dr. Gordon Krip, executive director, Society of Toxicology of Canada, PO Box 517, Beaconsfield, PQ H9W 5V1

Dec. 7-9, 1990: British Columbia Anaesthetists' Society/Washington State Society of Anesthetists Annual Meeting — Myths and Controversies in Anaesthesia
Four Seasons Hotel, Vancouver
Ms. Ellen MacNeill, British Columbia Anaesthetists' Society, c/o British Columbia Medical Association, 115-1665 W Broadway, Vancouver, BC V6J 5A4; (604) 736-5551, ext. 234, FAX (604) 736-4566

Feb. 7-9, 1991: Conference on Medicine and the Humanities
Dalhousie Medical School, Halifax
Professor June Penney, Office of the Dean, Faculty of Medicine, Sir Charles Tupper Medical Building, Dalhousie University, Halifax, NS B3H 4H7; (902) 494-3400

Feb. 21-24, 1991: Pan-American Doctors' Club (Canadian section) 45th Meeting
Manzanillo, Mexico
Dr. Donald P. Hill, vice-president, Medical Affairs, Continuing Medical Education, Ottawa General Hospital, 501 Smyth Rd., Ottawa, Ont. K1H 8L6; (613) 737-8455

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