Structured Abstracts. Narrative Review

Resumos estruturados. Revisão narrativa

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ABSTRACT

Purpose: To summarize the main findings from research on structured abstracts. **Methods:** A narrative review of all the relevant papers known to the author was conducted. **Results**: Authors and readers judged the structured abstracts to be more useful than traditional ones. In 1987 the Ad Hoc Working Group for Critical Appraisal of the Medical Literature proposed guidelines for informative seven-headings abstracts. In 1990 Haynes et al. reconsidered the structured abstract of clinical research and review articles and proposed revised guidelines. Nowadays, most abstracts are informative, and the most commonly used structure is IMRAD (Introduction, Methods, Results And Discussion) format. **Conclusions**: There are many variations in the structured-abstract formats prescribed by different journals. But even in recent years, not all abstracts of original articles are structured. More research is needed on a number of questions related to the quality and utility of structured abstracts.

Key words: Abstracting and indexing. Review literature. Peer review

RESUMO

Objetivo: Sintetizar os principais resultados das pesquisas sobre resumos estruturados..

Métodos: Uma revisão narrativa de todos os estudos, considerados relevantes pelo autor, foi realizada. **Resultados:** Os autores e os leitores julgaram que os resumos estruturados são mais úteis que os tradicionais. Em 1987, o Ad Hoc Working Group for Critical Appraisal of the Medical Literature propôs diretrizes para a elaboração de resumos informativos com sete seções. Haynes e col., em 1990, reestudaram os resumos estruturados para a pesquisa clínica e para os artigos de revisão e propuseram novas diretrizes. Atualmente, a maioria dos resumos é informativa e a estrutura mais utilizada é aquela do formato IMRAD (Introdução, Métodos, Resultados e Discussão)

Conclusão: Há muita variação nos formatos dos resumos estruturados solicitados pelo vários periódicos. Contudo, mesmo nos anos mais recentes, nem todos os resumos dos artigos originais são estruturados. Necessita-se de mais pesquisas relacionadas à qualidade e à utilidade dos resumos estruturados.

Descritores: Resumos e indexação. Literatura de revisão. Comissão de avaliação de exercício profissional

Types of abstracts

Since its origin in 1665, the scientific paper has been through many changes, but method description only developed during the second half of the 19th century. In the course of the 20th century, the formal established Introduction, Methods, Results, And Discussion (IMRAD) structure was adopted.[1] The proposed structured abstract, that is, abstract that describe a study using content headings, provided more informative content. Except for the title, the abstract is the part of a scientific paper that will be read by the most people.[2] The basic purpose of abstracts is to summarize the contents of articles so that readers can decide whether to read them. It is the only part of an article that many journals will make accessible through search engines.[3]

Indicative or descriptive abstracts deal with the contents of the paper, whereas informative abstracts tell us about the objectives, methods, results and conclusions. Nowadays, most abstracts are informative, and the most commonly used structure is IMRAD format.[4]

Most clinical journals did not include abstracts with articles until the late 1960s. Then, the Journal of the American Medical Association and the Canadian Medical Association Journal moved the summary and conclusions of papers to the beginning (Table 1). The presence of an abstract as the introduction to medical reports was of enormous assistance to computerized services.[5]

TABLE 1 - Example of a non-structured abstract.[6]

Over a 6-month period 2025 patients admitted to New Mount Sinai Hospital, Toronto were screened for hepatitis B surface antigen (HBsAg) by counter-immunoelectrophoresis (CIEP) and radioimmunoassay (RIA). CIEP detected 12 HBsAg-positive patients and RIA 16. RIA is therefore the more sensitive test for HBsAg. Of the 16 patients 2 had liver disease previously diagnosed, 3 had malignant disease and 11 were asymptomatic carriers. Of the 11 carriers all were born

in countries where the carrier rate is known to be high. Routine screening of hospital patients on admission is of no value in detecting unsuspected liver disease but is of value in detecting asymptomatic carriers, which is of importance for the patient and his family. Routine screening tests for HBsAg in Canadian hospitals that treat many patients born in countries with a known high HBsAg prevalence is recommended. Routine screening is also recommended in all hospitals in Mediterranean and Asian countries.

In 1987 the Ad Hoc Working Group for Critical Appraisal of the Medical Literature proposed guidelines for informative seven-headings abstracts. These guidelines were prepared by Haynes and colleagues at McMaster University, Canada and then with 358 persons from 18 countries (four Brazilian members: Deolinda Martins, L. dos Santos Neto, M. G. Pereira e César G. Victora) (Table 2).[7,8] The structured proposal was for original articles dealing with the cause, course, diagnosis, and treatment of health care problems. It did not include articles such as editorials, reviews, case reports, etc. Table 3 shows an example of these guidelines.

TABLE 2 - Key information neeeded for a structured abstract.[7]

1. Objective: the exact question(s) addressed by the article.
2. Design: the basic design of the study.
3. Setting: the location and level of clinical care.
4. Patients or Participants: the manner of selection and numbers of patients or participants who entered and completed the study.
5. Interventions: the exact treatment or interventions, if any.
6. Measurements and Results: the methods of assessing patients and key results.
7. Conclusions: key conclusions including direct clinical applications.

TABLE 3 - A seven-headings structured abstract[9]

Objective: To evaluate the effectiveness and safety of tolrestat, an aldose-reductase inhibitor, in patients with mild diabetic autonomic and peripheral neuropathy.

Design: Randomized, placebo-controlled, double-blind 52-week trial.

Setting: University hospital clinic.

Patients: Forty-five diabetic patients with asymptomatic autonomic neuropathy identified by at least one pathological cardiovascular reflex test result.

Interventions: All patients were given placebo during a 4-week run-in period (single-blind). Twenty patients were randomly assigned to continue to receive placebo, and 25 were assigned to treatment with tolrestat (200 mg/d given in the morning).

Measurements and Results: At 12 months, improvements in nerve functions occurred in patients receiving tolrestat. Compared with baseline values, postural hypotension decreased by a value of 5.9 mm Hg (95% CI, 1.6 to 8.7); deep-breathing, maximum/minimum heart rate (expiration/inspiration ratio) increased by a value of 0.026 (CI, 0.015 to 0.036); and lying-to-standing heart rate ratio (30:15 ratio) increased by a value of 0.032 (CI, 0.027 to 0.052). In the placebo group, all test results except postural hypotension deteriorated. Vibration perception threshold at the malleolus and great toe of the dominant leg improved in the tolrestat group (- 1.4; CI, - 3.69 to - 1.09) but tended to worsen in the placebo group during the study period. No important side effects were detected in either group.

Conclusions: The progression of mild diabetic autonomic and peripheral neuropathy may be halted or even reversed by pharmacologic intervention with the aldose-reductase inhibitor tolrestat.

In Brazil 1988 the Revista Paulista de Medicina suggested the authors to use this seven-sections abstract when reporting clinical trials.[10] Also in this year, it was proposed a structured abstract for reviews with the headings: Objective, Data sources, Methods of study selection, Data extraction and synthesis, and Conclusions (Table 4). Table 5 shows an example of these six guidelines.

TABLE 4 - Guidelines for abstract of review articles[11]

1. Purpose: the primary objective of the review.
2. Data identication: a succinct summary of data sources.
3. Study selection: the number of studies selected for review and how they were selected.
4. Data extraction: the type of guidelines used abstracting data and how they were applied.
5. Results of data synthesis: the methods of data synthesis and key results.
6. Conclusions: key conclusions, including potential applications and research needs.

Table 5 - A structured abstract of a review article[12]

Purpose: To ascertain the clinical benefits of digitalis treatment in patients with chronic congestive heart failure and sinus rhythm.

Data identification: An English-language literature search using MEDLINE (1966-82), Index Medicus (1960-65), and bibliographic review of textbooks and review articles.

Study selection: After independent review by three observers, 16 of 736 originaly identified articles were selected tha specifically addressed the stated purpose.

Data extraction: Three observers independently assessed studies using explict methodologic criteria for

evaluating the quality of clinical trials.

Results of data synthesis: Because of deficient selection criteria and study methods in 14 studies, therapeutic efficacy could not be adequately assessed. Two randomized, double-blind, placebo-controlled studies suggested that digitalis could be successfully withdrawn from elderly patients with stable hear failure, whereas patients with a S3 gallop might benefit from digitalis.

Conclusions: The benefits of digitalis treatment for patients with congestive heart failure and synus rhythim are not well established. To better delineate the therapeutic benefits of digitalis, investigators must conduct more rigorously designed trials involving patients with newly diagnosed failure and varying degrees of failure.

The proposed structured abstract for reviews has many advantages: 1. readers can identify reviews that are relevant; 2. bias can be detected; 3. results and conclusions can be critically appraised; 4. authors are given a framework that will help them present their results; 5. vital elements of a review are identified; 6. computerized literature searches will be possible, and 7. improved peer review processes may result.[11]

In 1990, Haynes et al. reconsidered the structured abstract of clinical research and review articles (including meta-analysis) and proposed revised guidelines. They emphasized 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 (Table 6).[5] Tables 7 and 8 show examples of these guidelines for an original and a review article.

TABLE 6 - Structured abstracts for original and review articles[5]

Original articles

1. Objective: the exact question (s) adressed by the article.
2. Design: the basic design of the study.
3. Setting: the location and level of clinical care.
4. Patients or participants: the manner of selection and the number of patients or participants who entered and completed the study.
5. Interventions: the exact treatment or intervention, if any.
6. Main outcome measures: the primary study outcome measured as planned before data collection began.
7. Results: the key findings.
8. Conclusions: key conclusions including direct clinical applications

Review articles

1. Purpose: the primary objective of the review.
2. Data sources: a succint summary of data sources.
3. Study selection: the number of studies selected for review and how they are selected.
4. Data extraction: rules for abstracting data and how they were applied.
5. Results of data synthesis: the methods of data synthesis and key results.

Conclusions: key conclusions, including potential applications and research needs.

TABLE 7 - A structured abstract of an original article[13]

Objective: To evaluate the safety and immunogenicity in adults of several different concentrations of an acellular pertussis vaccine.

Design: Double-blind, randomized, placebo-controlled trial.

Setting: Medical center immunization clinic.

Participants: One hundred eighteen healthy adult volunteers.

Interventions: Participants received standard adult tetanus-diphtheria vaccine alone or combined with full-strength, half-strength, or quarter-strength concentrations of a currently licensed acellular pertussis vaccine used for booster doses in young children. Full-strength vaccine contained 40 micrograms of pertussis proteins, consisting of 86% filamentous hemagglutinin, 8% pertussis toxin, 4% 69-kd outer-membrane protein, and 2% agglutinogens.

Main outcome measures: Local and systemic reactions were assessed for 14 days after vaccination. Serum samples for antibody assay were obtained before, 1 month after, and 1 year after immunization.

Results: Adverse reactions were few and minor and did not differ in frequency or severity among the four study groups. The groups receiving acellular pertussis vaccine showed strong antibody responses to pertussis antigens, which did not significantly differ by concentration of vaccine. After 1 year, levels of antibody to pertussis had declined by approximately 50% but remained substantially higher than preimmunization levels. The four groups did not differ in antibody responses to tetanus or diphtheria toxoids.

Conclusions: Routine reimmunization of adults with a vaccine containing acellular pertussis antigens in addition to diphtheria and tetanus toxoids can substantially enhance pertussis antibody levels without an increase in adverse reactions or diminution in response to the diphtheria and tetanus components. Such a program might materially reduce respiratory illness among both adults and children.

TABLE 8 - A structured abstract of a review article[14]

Objective: To determine the relative exposure to environmental tobacco smoke for bar and restaurant employees compared with office employees and with nonsmokers exposed in the home (part 1) and to

determine whether this exposure is contributing to an elevated lung cancer risk in these employees (part 2)

Data sources: MEDLINE and bibliographies from identified publications.

Study selection: In part 1, published studies of indoor air quality were included if they reported a mean concentration of carbon monoxide, nicotine, or particulate matter from measurements taken in one or more bars, restaurants, offices, or residences with at least one smoker. In part 2, published epidemiologic studies that reported a risk estimate for lung cancer incidence or mortality in food-service workers were included if they controlled, directly or indirectly, for active smoking.

Data extraction: In part 1, a weighted average of the mean concentration of carbon monoxide, nicotine, and respirable suspended particulates reported in studies was calculated for bars, restaurants, offices, and residences. In part 2, the relative lung cancer risk for food-service workers compared with that for the general population was examined in the six identified studies.

Data synthesis: Levels of environmental tobacco smoke in restaurants were approximately 1.6 to 2.0 times higher than in office workplaces of other businesses and 1.5 times higher than in residences with at least one smoker. Levels in bars were 3.9 to 6.1 times higher than in offices and 4.4 to 4.5 times higher than in residences. The epidemiologic evidence suggested that there may be a 50% increase in lung cancer risk among food-service workers that is in part attributable to tobacco smoke exposure in the workplace.

Conclusions: Environmental tobacco smoke is a significant occupational health hazard for food-service workers. To protect these workers, smoking in bars and restaurants should be prohibited.

Structured abstracts (≤ 250 words) were designed to meet three objectives of informing readers better, improving search retrieval, or facilitating peer review. They can be adapted for most investigations, including systematic reviews, conference articles and papers reporting laboratory studies. They were not expanded to cover case reports, studies of tissues or animals, and opinion articles.[5]

Parts of the abstract can be written in phrases rather than completed sentences. (For example: 2. Design. Double-blind randomized trial, rather than 2. Design. The study was conduted as a double-blind, randomized trial.) This technique facilitates selection scanning and allows more information per unit of space.[5]

The advantage of structured abstracts is that it is easier to understand the text written in shorter paragraphs. They help authors not to omit relevant data, and reveals methodological errors. Structured abstracts in English are also convenient to non-English authors.[4]

Structured abstracts contain the most significant data from the paper, and some use them as primary source of information. Writing a good abstract requires considerable attention to details. Very often the decision whether the paper is going to be accepted for publication or not, depends on the title and abstract. The author has about 15 seconds to convince readers to read the rest of the paper. Only about 50% of the research projects submitted as conference abstracts will eventually be published as full articles.[4]

Abstracts mostly written in the same language as the article, but are also translated into other languages. Abstracts should be written in the past tense and in third person singular. Omit all references to the literature and the tables or figures, and omit obscure abbreviations and acronyms.[4]

In 1996 July the editors of the Annals of Internal Medicine realized that the structured abstract did not provide adequate context for a study, and asked authors to add a Background section (Table 9).[3]

TABLE 9 - A structured abstract with Background[15]

Background: In patients who have symptomatic deep venous thrombosis, the long-term risk for recurrent venous thromboembolism and the incidence and severity of post-thrombotic sequelae have not been well documented.

Objective: To determine the clinical course of patients during the 8 years after their first episode of symptomatic deep venous thrombosis.

Design: Prospective cohort study.

Setting: University outpatient thrombosis clinic.

Patients: 355 consecutive patients with a first episode of symptomatic deep venous thrombosis.

Measurements: Recurrent venous thromboembolism, the post-thrombotic syndrome, and death. Potential risk factors for these outcomes were also evaluated.

Results: The cumulative incidence of recurrent venous thromboembolism was 17.5% after 2 years of follow-up (95% CI, 13.6% to 22.2%), 24.6% after 5 years (CI, 19.6% to 29.7%), and 30.3% after 8 years (CI, 23.6% to 37.0%). The presence of cancer and of impaired coagulation inhibition increased the risk for recurrent venous thromboembolism (hazard ratios, 1.72 [CI, 1.31 to 2.25] and 1.44 [CI, 1.02 to 2.01], respectively). In contrast, surgery and recent trauma or fracture were associated with a decreased risk for recurrent venous thromboembolism (hazard ratios, 0.36 [CI, 0.21 to 0.62] and 0.51 [CI, 0.32 to 0.87], respectively). The cumulative incidence of the post-thrombotic syndrome was 22.8% after 2 years (CI, 18.0% to 27.5%), 28.0% after 5 years (CI, 22.7% to 33.3%), and 29.1% after 8 years (CI, 23.4% to 34.7%). The development of ipsilateral recurrent deep venous thrombosis was strongly associated with the risk for the post-thrombotic syndrome (hazard ratio, 6.4; CI, 3.1 to 13.3). Survival after 8 years was 70.2% (CI, 64.7% to 75.6%). The presence of cancer increased the risk for death (hazard ratio, 8.1; CI, 3.6 to 18.1).

Conclusions: Patients with symptomatic deep venous thrombosis, especially those without transient risk factors for deep venous thrombosis, have a high risk

for recurrent venous thromboembolism that persists for many years. The post-thrombotic syndrome occurs in almost one third of these patients and is strongly related to ipsilateral recurrent deep venous thrombosis. These findings challenge the widely adopted use of short-course anticoagulation therapy in patients with symptomatic deep venous thrombosis.

Finally, in 2004 Mar the editors of the Annals of Internal Medicie proposed a new type of structured abstract (a critical one). They became concerned that abstracts may give readers the impression that the research has no flaws. In the structured abstract, they included a new section on Limitations, located immediately before Conclusions, a spot that should attract the attention of the. Reflecting on the limitations of a study can help readers decide whether results apply to their patients.[3] Table 10 shows an example of a ten-sections structured abstract with Limitations.

TABLE 10 - A structured abstract with Limitations[16]

Background: Obesity is a major, growing health problem. Observational studies suggest that bariatric surgery is more effective than nonsurgical therapy, but no randomized, controlled trials have confirmed this.

Objective: To ascertain whether surgical therapy for obesity achieves better weight loss, health, and quality of life than nonsurgical therapy

Design: Randomized, controlled trial.

Setting: University departments of medicine and surgery and an affiliated private hospital.

Patients: 80 adults with mild to moderate obesity (body mass index, 30 kg/m2 to 35 kg/m2) from the general community.

Interventions: Patients were assigned to a program of very-low-calorie diets, pharmacotherapy, and lifestyle change for 24 months (nonsurgical group) or to placement of a laparoscopic adjustable gastric band (LAP-BAND System, INAMED Health, Santa Barbara, California) (surgical group).

Measurements: Outcome measures were weight change, presence of the metabolic syndrome, and change in quality of life at 2 years.

Results: At 2 years, the surgical group had greater weight loss, with a mean of 21.6% (95% CI, 19.3% to 23.9%) of initial weight lost and 87.2% (CI, 77.7% to 96.6%) of excess weight lost, while the nonsurgical group had a loss of 5.5% (CI, 3.2% to 7.9%) of initial weight and 21.8% (CI, 11.9% to 31.6%) of excess weight ($P < 0.001$). The metabolic syndrome was initially present in 15 (38%) patients in each group and was present in 8 (24%) nonsurgical patients and 1 (3%) surgical patient at the completion of the study ($P < 0.002$). Quality of life improved statistically significantly more in the surgical group (8 of 8 subscores of Short Form-36) than in the nonsurgical group (3 of 8 subscores).

Limitations: The study included mildly and moderately obese participants, was not powered for comparison of adverse events, and examined outcomes only for 24 months.

Conclusions: Surgical treatment using laparoscopic adjustable gastric banding was statistically significantly more effective than nonsurgical therapy in reducing weight, resolving the metabolic syndrome, and improving quality of life during a 24-month treatment program.

Research

Tadio et al. reported a blind, observational study of nonstructured and structured abstracts of original articles in the British Medical Journal, the Canadian Medical Association Journal and the Journal of the American Medical Association. The quality of 300 abstracts was measured against objective criteria, and the findings supported recommendations that suggest the use of structured abstracts.[17]

The number of Medline journal publishing structured abstracts increase between 1989 and 1991. Articles with structured abstracts had more access points (Medical Subject Heading [MeSH®] terms and text words) than MEDLINE articles as a whole.[18]

Timmer et al. have developed a reliable and applicable instrument for the evaluation of the quality of abstracts. While most useful for clinical trials, limitations may apply for its use in basic science. It may be helpful as a checklist for the preparation of abstracts or as an instrument to compare abstract quality between meetings. Other possible applications include the adjunct use in abstract peer review.[19]

The results of studies comparing tradicional abstracts with structured abstracts, suggest that the later: contain more information; are easier to read and to search; are easier to recall; facilitate peer review for conference proceedings; are welcomed by readers and by authors. However, there have been some qualifications: take up more space; sometimes have confusing typographic layouts; and may have the same sorts of omissions and distortions.[20]

A cross-sectional study has measured the frequency of articles written under the IMRAD format from 1935 to 1985 in a randomly selected samples of articles published in four leading journal in Internal Medicine: the British Medical Journal, JAMA, The Lancet, and the New England Journal of Medicine. The IMRAD structure began to be used in the 1940s. In the 1970s, it reached 80% and, in the 1980s, was the only pattern adopted by these journals for original papers.[21]

Even in recent years, not all abstracts of original articles are structured. Patterns of abstracts recently (2001 Jan) published in the ''Medicine, General and Internal'' top thirty journals (ISI 2000 impact factors) were examined. Among 304 original articles that included abstracts, 188 (61.8%) had structured and 116 (38.2%) had unstructured abstracts. One hundred twenty-five (66.5%) of the abstracts used the IMRAD format, and 63 (33.5%) used the 8-heading format

proposed by Haynes et al. Twenty-one journals requested structured abstracts in their instructions to authors; 8 journals requested the 8-heading format; and 1 journal requested it only for intervention studies.[22]

ICMJE position

The International Committee of Medical Journals Editors updated the Uniform Requirements for Manuscripts Submitted to Biomedical Journals (followed by most medical journals) last 2006 February. In Section IV.A.4 (Abstracts and Key Words) it is stated: The abstract should provide the context or background for the study and should state the study's purposes, basic procedures (selection of study subjects or laboratory animals, observational and analytical methods), main findings (giving specific effect sizes and their statistical significance, if possible), and principal conclusions. It should emphasize new and important aspects of the study or observations. Because abstracts are the only substantive portion of the article indexed in many electronic databases, and the only portion many readers read, authors need to be careful that abstracts reflect the content of the article accurately. Unfortunately, many abstracts disagree with the text of the article. The format required for structured abstracts differs from journal to journal, and some journals use more than one structure; authors should make it a point prepare their abstracts in the format specified by the journal they have chosen.[23]

Conclusions

Authors and readers judge the structured abstracts to be more useful than traditional ones. There are many variations in the structured-abstract formats prescribed by different journals. Nowadays, the most commonly used structure is IMRAD. But even in recent years, not all abstracts of original articles are structured. More research is needed on a number of questions related to the quality and utility of structured abstracts.

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