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Completeness of reporting in abstracts from clinical trials of pre-harvest interventions against foodborne pathogens

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ABSTRACT

Abstracts are the most commonly read part of a journal article, and play an important role as summaries of the articles, and search and screening tools. However, research on abstracts in human biomedicine has shown that abstracts often do not report key methodological features and results. Little research has been done to examine reporting of such features in abstracts from papers detailing pre-harvest food safety trials. Thus, the objective of this study was to assess the quality of reporting of key factors in abstracts detailing trials of pre-harvest food safety interventions.

A systematic search algorithm was used to identify all *in vivo* trials of pre-harvest interventions against foodborne pathogens in PubMed and CAB Direct published from 1999 to October 2009. References were screened for relevance, and 150 were randomly chosen for inclusion in the study. A checklist based on the CONSORT abstract extension and the REFLECT Statement was used to assess the reporting of methodological features and results. All screening and assessment was performed by two independent reviewers with disagreements resolved by consensus.

The systematic search returned 3554 unique citations; 356 were found to be relevant and 150 were randomly selected for inclusion. The abstracts were from 51 different journals, and 13 out of 150 were structured. Of the 124 abstracts that reported whether the trial design was deliberate disease challenge or natural exposure, 113 were deliberate challenge and 11 natural exposure. 103 abstracts detailed studies involving poultry, 20 cattle and 15 swine.

Most abstracts reported the production stage of the animals (135/150), a hypothesis or objective (123/150), and results for all treatment groups (136/150). However, few abstracts reported on how animals were grouped in housing (25/150), the location of the study (5/150), the primary outcome (2/126), level of treatment allocation (15/150), sample size (63/150) or whether study units were lost to follow up (4/150). Forty-eight (48/150) abstracts reported the name, mode of administration, dose and duration of the intervention(s), while 102 (102/150) reported at least one of these elements. Nine (9/150) abstracts specified that allocation of study units to treatments was randomized, and none of the abstracts reported whether blinding was used (0/150).

These results reveal gaps in reporting of methodological features and results. Thus, improving reporting quality in abstracts should be a crucial goal to be pursued by authors, reviewers and journal editors.

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1. Introduction

With the exception of the title, abstracts are the most commonly – an often the only – read part of journal articles (Pitkin, 1987; Pitkin and Branagan, 1998). First introduced in the 1950s (Narine et al., 1991), abstracts present articles' objectives, methodology, results and conclusions in brief form, and provide a method for readers to determine which articles to read in their entirety (Pitkin, 1987; Hopewell et al., 2008b). With the number of research articles indexed on Medline almost tripling between 1966 and 2000 (Loria and Arroyo, 2005), well-written abstracts are essential for accurate searches. With an increased emphasis on evidence-based decision making in medicine, abstracts increasingly are important as search and screening tools for systematic reviews. Further, where technological or financial barriers prevent full-text access, abstracts may be the only information a clinician has (Hopewell et al., 2008a), and even where full text is available, clinicians' decisions may be based upon abstracts alone (Haynes et al., 1990). It is, therefore, vital that abstracts provide accurate and high quality information.

The issue of poor quality of reporting in abstracts in human biomedical clinical journals has been recognized, with a study of *Canadian Medical Association Journal* (CMAJ) abstracts indicating that on average, one-third of basic expected information was missing, and 19 of 29 abstracts presented conclusions that were not consistent with the results (Pitkin, 1987; Narine et al., 1991). Cook and colleagues evaluated experimental studies in medical education, and found that descriptions of setting, participants, comparison groups and outcomes were identified in less than 50% of abstracts and only 19% of abstracts described the study design (Cook et al., 2007). Berwanger et al. (2009) assessed 227 abstracts from randomized controlled trials (RCTs) published in 2006 in four top medical journals (*New England Journal of Medicine* (NEJM), *Journal of American Medical Association* (JAMA), *British Medical Journal* (BMJ) and *The Lancet*). In these abstracts, randomization and objective(s) were reported in more than 90%, but indicators of methodological quality such as blinding were not well reported. Effect size and confidence intervals were included in only 62% of the abstracts. Concerns about these deficiencies have been addressed by the publication of "A Proposal for More Informative Abstracts of Clinical Articles" (Haynes, 1987), and an extension to the **CON**solidated **S**tandards **o**f **R**eporting **T**rials (CONSORT), which provides guidelines for abstracts in randomized clinical trials (Hopewell et al., 2008a,b).

However, for veterinary medicine, specifically trials of pre-harvest interventions against foodborne pathogens, there has been little study on the quality of abstracts. Research has revealed significant deficiencies in the reporting of pre-harvest trials in the full text of peer-reviewed papers (Sargeant et al., 2009a,b). The subsequent publication of the **R**eporting guid**E**lines **F**or randomized contro**L**led trials for liv**E**sto**C**k and food safe**T**y (REFLECT) Statement (Sargeant et al., 2010; O'Connor et al., 2010) (www.reflect-statement.org), which provides a standard for reporting of key factors in pre-harvest clinical trials, is intended to improve reporting quality. However, REFLECT focuses on content in the text, and in comparison to the 17 item checklist in the CONSORT extension for abstracts, the section on title and abstract in the REFLECT Statement indicates only two items that should be included: (1) allocation to treatment groups and (2) whether the outcome was the result of natural exposure or deliberate disease agent challenge (O'Connor et al., 2010).

Effective reporting in abstracts is vital, given the focus on pre-harvest interventions to reduce or eliminate the burden of foodborne illness, and the importance of abstracts in veterinary evidence-based medicine and systematic reviews. By assessing the quality of reporting in abstracts, we can determine which factors are or are not being adequately reported and whether there is a need for more formal abstract reporting standards in pre-harvest food safety research.

Thus, the aim of this study was to assess the quality of reporting of key factors in abstracts detailing trials of pre-harvest food safety interventions.

2. Materials and methods

2.1. Search

A systematic search strategy was used to identify all published reports of *in vivo* trials of pre-harvest interventions against foodborne pathogens. Two electronic databases, PubMed and Centre for Agricultural Bioscience Direct (CAB Direct), were searched for articles published between January 1st 1999 and October 4th 2009. The search protocol was adapted from the search terms used by Sargeant et al. (2009a,b), and involved combinations of animal terms, trial terms, food safety terms and exclusion terms (Table 1). The Boolean operator "AND" was used to separate animal, trial and food safety terms, operator "NOT" append terms were used to exclude articles related to post-harvest processing and aquatic commodity groups, and "OR" was used to separate words within each set of terms. Citations were imported into RefWorks and duplicate references were eliminated using the RefWorks de-duplication function and subsequent manual screening.

2.2. Relevance screening

Citations were screened using a relevance tool that included four relevance criteria, and was based on the screening tool in Sargeant et al. (2009a,b). Firstly, the citation had to describe a study reporting results of original research from a clinical or challenge trial conducted in a food animal species. Case studies, reviews, descriptive epidemiological studies, observational studies, *in vitro* experiments, conference proceedings, books and theses/dissertations were excluded. The study described also had to involve administration of an intervention to a live animal (bovine, ovine, caprine, swine, poultry) or eggs intended for hatching, and report at least one outcome related to pre-harvest food safety. Studies involving non-human pathogenic strains of *Salmonella* were excluded, as were studies where all outcomes involved measures of immune function, measures of serum antibodies or