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## Original articles

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### Retraction and republication—a new tool for correcting the scientific record?

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**Abstract:** Mistakes in the scientific literature are reasonably common; however, the available methods to communicate corrections to published articles or retract unreliable findings do not always meet the needs of readers, authors, editors, and publishers. In this article, we propose an innovative process of retraction and republication: the purpose of this instrument is to correct the scientific literature for situations in which a published article is realized to contain pervasive error, but still contains important scientific findings. We present two case studies of its use in *The Lancet* and *The Lancet Respiratory Medicine*.

**Keywords:** retraction, publication, ethics, correction

#### Introduction

Retraction is the formal withdrawal of a scientific article or other publication. The Committee on Publication Ethics recommends that editors should consider retraction of articles in cases of duplicate publication, plagiarism, or reporting of unethical research, or in cases with clear evidence that the study findings are unreliable.<sup>1</sup> The purpose is to ensure that the scientific record remains accurate, and to inform readers that the research findings and conclusions cannot be relied on; COPE explicitly states that the purpose of retractions is “to correct the literature and ensure its integrity rather than to punish authors who misbehave”. However, although unreliable findings can result from misconduct or genuine error, retraction is often associated with high-profile scandals involving scientific fraud, with reputational implications—so-called ‘retraction stigma’—for the authors of retracted articles irrespective of the cause for retraction.<sup>2</sup>

Authors of retracted articles suffer a ‘citation penalty’ of 10%, and authors of papers that are retracted because of “honest errors” similarly have lower citations.<sup>3</sup> Other researchers in the field can also be affected by retractions, with a 5% to 10% reduction in citations and a decline in funding activity for future research.<sup>4</sup>

This leaves journal editors with a dilemma when presented with evidence that research they have published contains extensive or pervasive errors. A correction notice could be used, but this does not represent a transparent mechanism for papers with large numbers of errors, does not necessarily remove the erroneous results from the scientific record, and is unsatisfactory when errors in the data affect the interpretations and conclusions of a study. A retraction would correct the scientific record by removing

the erroneous findings, but a retraction alone might also remove valuable and important data. Further, retraction stigma could unfairly penalize authors who have been proactive in disclosing problems with their research, and potentially discourage other researchers from being honest about mistakes in the future.

Therefore, the aim of this article is to describe an innovative process of retraction and republication to transparently correct the scientific record, and present two case studies of its use.

#### Case 1: *The Lancet*—editorial retraction

In January, 2014, *The Lancet* received an epidemiological investigation of the burden and treatment of heart attacks in China across a 10 year period. The study involved analysis of data from 162 hospitals, which were then weighted to derive nationally representative estimates. The findings were important but disturbing: although China had increased the coverage of critical interventions for heart attacks, in-hospital mortality had not changed. In other words, China faced a crisis in the quality of its rapidly expanding health services. After peer review and several rounds of revision, the article was accepted in May, 2014, copy edited and published online on June 24, 2014,<sup>5</sup> together with a commissioned accompanying comment that quoted some of the study’s findings.<sup>6</sup> Print publication was planned for a special issue in late August.

On August 14, the authors alerted the journal to an error in the published article. A miscalculation in the weight of one of the urban areas in the study had affected data in the results section, figures, tables, and appendix. The effect of the error was fairly small, with the magnitude, direction, and significance of the results virtually unchanged (for example, the use of aspirin within 24 hours of hospital admission in 2001 changed from 79.3% [95% CI 77.3–81.3] to 79.7% [95% CI 77.9–81.5]). However, the miscalculation affected almost every numerical result in the paper. Further, there were just 8 days between when the error came to light and the press deadline for the scheduled print issue.

The planned print publication of the article was put on hold while the corrected data were peer reviewed by two clinical reviewers and two statistical reviewers involved. All agreed that, although the errors were extensive, the corrections were appropriate and the conclusions of the study were unchanged.

## Retraction and republication

The journal's editors had several options. We could kill the paper, by retracting it. The errors were sufficiently extensive to potentially damage our confidence in the work. But we knew that the findings could make a vitally important contribution to advancing the quality of care for one of the commonest causes of death in China. We wanted to preserve the paper in some way. But how? Our proposed solution was to retract the original article, then immediately republish it as the corrected version<sup>7</sup>, along with a web appendix containing the original article and outlining the changes made between the two versions. Additionally, as is our usual procedure with retractions, a comment would be written by the journal's editors outlining the reasons for retraction, and communicating the procedure to readers.<sup>8</sup> The quoted data in the accompanying comment<sup>6</sup> would be simultaneously corrected through normal erratum procedures.

We communicated this proposal to the paper's authors and the peer reviewers of the correction. After some deliberation, the authors, reviewers, and authors of the linked comment article agreed that this would be the fairest and most transparent way to proceed.

The in-house copy editor set about preparing the files for the retraction and republication. These comprised:

1. The original version of the paper, with incorrect data highlighted
2. The corrected version of the paper, with corrected data highlighted
3. A 'clean copy' of the corrected version of the paper.

Figure 1 shows the retraction and republication process for the China PEACE study in *The Lancet*.

The copyeditor prepared the new files and an erratum

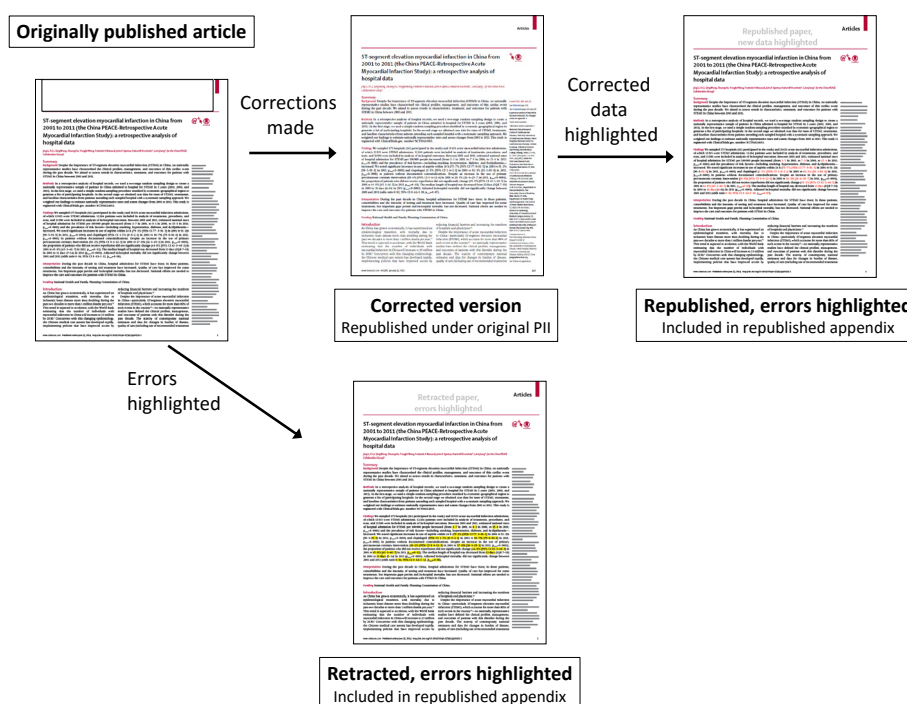
notice, and the journal's editors drafted the retraction notice. After approval of the corrected proofs by the respective authors of the research article and linked comment, and extensive proofreading of all versions, the retraction and republication was scheduled for print and online publication in the issue of January 31, 2015.

Our attention now turned to the mechanics of publication. Our original intention was to instruct the publisher's web vendor to retract the original article under its original Publisher Item Identifier (PII), in a process the publisher terms "tombstoning" (used for whenever published content must be withdrawn, for example due to retraction or legal issues). This would result in the original PDF and XML versions on the publisher's website being replaced by a 'RETRACTED' watermarked version. The corrected version would then be republished under a new PII.

However, after the files for the January 31 issue were compiled and supplied to the vendor, it emerged that due to a miscommunication between the production team, the web production team, and the vendor, a new PII had not been obtained for the republished version of the article. To avoid delay to delivery of the entire issue, the corrected version was therefore republished under the original PII. Consequently, it became impossible to formally retract the original version through Elsevier's tombstoning procedure. Despite this difficulty, the 'editorial retraction' was successful, with publication of the retraction notice in the issue<sup>8</sup> and clear identification of the retracted version of the article in the online web appendix of the article.

As of January 18, 2016, the study had 13 citations (including one from before the retraction and republication<sup>11b</sup>), with an Altmetric score of 139 and a Scopus Field-Weighted Citation Impact of 21.28<sup>11c</sup>.

**Figure 1: Editorial retraction and republication of *The Lancet* China PEACE study**



**Case 2: The Lancet Respiratory Medicine—full retraction and republication**

In April, 2014, a study on tracheostomy mortality in intensive care units (ICU) was submitted to *The Lancet Respiratory Medicine*. The article was a meta-analytical investigation, aiming to assess the effect of tracheostomy timing (early vs late or no tracheostomy) on mortality in critically ill patients who were receiving ventilation. The article was peer reviewed and revised in several rounds, accepted, copyedited, and then published online on June 27, 2014 ahead of planned print publication in September<sup>11,12</sup>.

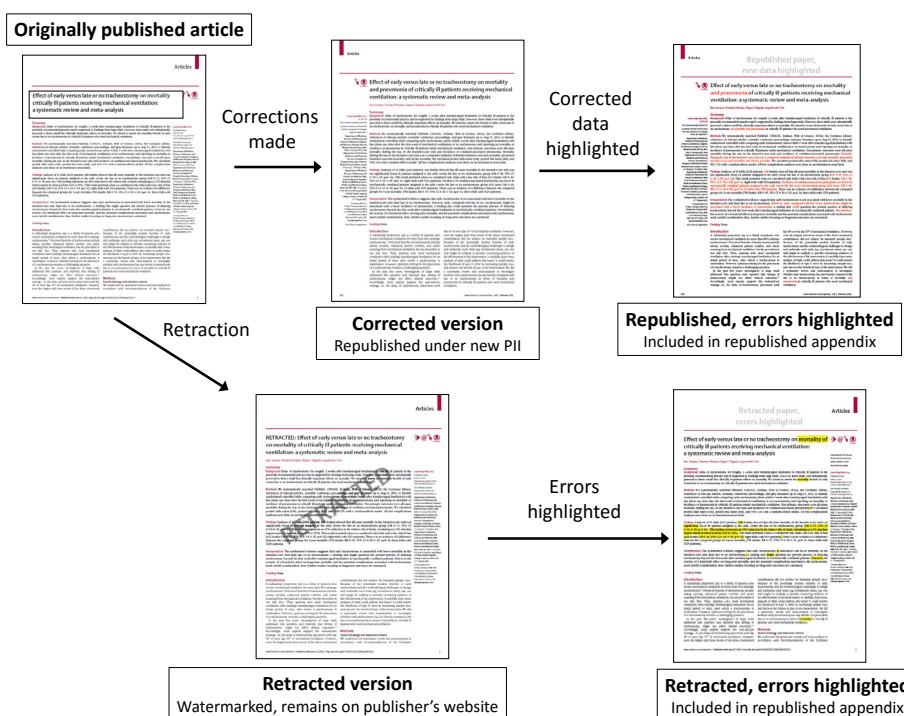
On July 4, 2014, the journal received a letter from two researchers who raised concerns about the use of mortality data for one of the trials that was included in the meta-analysis. The editors of *The Lancet Respiratory Medicine* contacted the authors of the article to inform them of these concerns and ask for a response. After some discussion and clarifications between the letter authors, editors, and authors of the article, the authors noted that an incorrect assumption had possibly been made when extracting data for two of the trials in their meta-analysis: patients who had not been discharged from the ICU were assumed to have died in the ICU; however, this assumption was not necessarily correct (for example, patients might have been transferred to other wards or hospitals, or might still have been in the ICU when follow-up ended). The authors were unable to obtain the correct mortality data for the two trials from the original study authors, so re-analyzed their results using an approximate measure. This reanalysis affected both the numerical findings and the overall outcome of the study’s co-primary endpoint; the finding of a significant difference in overall survival between the two tracheostomy groups in the original paper was not shown by a corrected analysis. On October 14, 2014, the editors of *The Lancet*

*Respiratory Medicine* issued an Expression of Concern to alert readers that data presented in the paper on ICU mortality were unreliable, with the next steps to be decided by a panel of experts.<sup>13</sup>

This panel comprised of peer reviewers of the original article and those who had not previously seen the paper. The members of the panel did not agree as to the most appropriate course of action: some reviewers felt that a correction notice would be sufficient, whereas others disagreed, feeling that the error undermined the results of the entire paper and that there was no choice but to retract it. The *Lancet Respiratory Medicine* editors agreed that an erratum notice would be insufficient, particularly as the interpretation and conclusions of the study had changed as a result of the data error. Discussions on a possible retraction and republication of the China PEACE study were then in process at *The Lancet*, and given that the error had been identified, the corrected findings were indeed reliable, and the analysis still represented an important contribution to the literature, the *Lancet Respiratory Medicine* editors proposed to retract and republish the tracheostomy study to ensure a transparent correction of the record, to which the study authors agreed.

In this retraction and republication, the incorrect article, published under the original PII, was successfully retracted via the publisher’s tombstoning process.<sup>11</sup> Figure 2 shows the retraction and republication process for the tracheostomy meta-analysis. The corrected article was then immediately published, under a new PII<sup>14</sup>, with a web appendix containing marked copies of both the retracted and republished versions. The republication was similarly accompanied by a retraction comment, outlining the reasons for retraction and republication<sup>15</sup>, along with a correction notice for the linked editorial. The article was

**Figure 2: Full retraction and republication of *The Lancet Respiratory Medicine* tracheostomy meta-analysis**



retracted and republished in the February, 2015, issue of *The Lancet Respiratory Medicine*.

As of January 18, 2015, the retracted version had no citations and an Altmetric score of 39, whereas the republished version had six citations, an Altmetric score of 15, and a Scopus Field-Weighted Citation Impact of 9.73.

### Discussion

In these case studies, we have presented two uses of a novel publishing mechanism of retraction and republication. Although the cases differed slightly, they each followed a core set of principles: retraction of the original article; immediate republication of the corrected article; publication of an appendix, clearly marked with the changes made between both versions; and publication of a retraction notice, outlining these procedures and the reasons for retraction.

The issue of data error presents journal editors with a significant dilemma. Obviously, erroneous data need to be removed from the scientific record as quickly as possible. However, the best way to do this is often unclear.

The first option is often to issue a correction notice; some journals, including *The Lancet* and other journals in the *Lancet* family, also provide a corrected PDF and XML version of the article online and, if possible, in print. This option has previously been used by *The Lancet* for research articles requiring extensive correction. However, this strategy is arguably unsatisfactory because it lacks transparency; readers might understandably be concerned about the study's reliability, yet a brief correction notice would give no space to explain the background of the error, the material impact it had on the presented data, or the steps taken by the journal to ascertain the reliability of the corrected version.

Further, in these two cases we were faced with a logistical issue in how to communicate the correction purely through an erratum notice. A summary statement that particular sections of the article “have been amended” would be inappropriately vague, particularly as the HTML/XML and PDF files of the original version of the article on our online publishing platforms (ScienceDirect and TheLancet.com) would be automatically replaced by the updated version. However, a full description of the changes made would be both unwieldy to publish and impenetrable for the reader to interpret. Additionally, for journals or publishers that only issue erratum notices and do not correct the published PDF or XML files, a correction does not remove the incorrect data from the scientific record.

### Strengths and challenges of retraction and republication

The obvious strength of the retraction and republication is that it combines the best aspects of both retraction and correction, and ensures that the scientific literature is corrected while not depriving the scientific community of valuable and reliable research findings. Versions of retraction and republication or “retraction and replacement” has previously been reported, but without provision of web appendices showing the changes made<sup>16</sup>

or commentaries explaining the source of the error and the reliability of the new findings<sup>17</sup>. The approach reported here—using appendices to show changes made between versions—although transparent, does however raise several difficulties.

An important limitation of retraction and republication is the resources required to implement it. Even though we benefited from full-time, professional peer review editors, production editors, copy editors, and web team editors, most of whom were physically located in the same offices, the practicalities of this retraction and republication were very complicated, with manual editing and proofreading of up to four different versions of each paper proving particularly challenging. It is unclear whether a more traditional publishing operation—with part-time or voluntary academic editors, contracted or outsourced copy editing and proofreading services, and a single publisher responsible for a portfolio of journals—would be capable of handling such a departure from usual publishing processes. However, retraction and republication does benefit from utilization of several familiar publishing workflows (ie retraction, online web appendices). With clear guidelines and authorial assistance in preparing the web appendix (showing the changes made between version), the burden on the editorial offices of smaller journals could be considerably reduced and retraction and republication might prove practical in a wide range of circumstances. Additionally, online tools such as Diffchecker (<https://www.diffchecker.com/>) could be used to facilitate transparent comparison between the two article versions.

It is unclear how retraction and republication might affect a journal's impact factor, altmetrics, or indexing. This is likely to depend on whether the corrected version is republished under the same PII and title (as for the *Lancet* article) or under a new PII and title (as for the *Lancet Respiratory Medicine* article), and rely on the precise categorization of references to retracted items. Thomson Reuters Journal Citation Reports uses titles to create unique 20-character abbreviations for each individual bibliographic entity, with non-title elements (such as city or country of publication) to distinguish between entities with similar titles.<sup>18</sup> Whether retracted and republished items would be classed as separate or linked bibliographic entities under this system—and how they affect a journal's impact factor—remains unclear. Elsevier uses PII numbers to register each article's Digital Object Identifier (DOI); therefore, republished articles with a new PII have a new DOI, and are registered as separate articles under the CrossRef system and other indexing systems using DOIs as identifiers (eg Scopus). The US National Library of Medicine, which runs the MEDLINE database, independently indexes journal content. Of note, it uses a publication type called “correction and republication”, which creates a new citation for a republished article and indexes it, enabling the new and original PubMed citations to be linked; both *The Lancet* and *The Lancet Respiratory Medicine* republished articles are labelled with this publication type. Similar approaches have recently been adapted by *JAMA Psychiatry*<sup>20,21</sup>. These case studies from *The Lancet* and *The Lancet Respiratory*

*Medicine*, and the *JAMA Psychiatry* example, were discussed at the International Committee of Medical Journal Editors meeting on November 9–10, in Delhi, India, and changes to the ICMJE Recommendations will be agreed after further discussion with the National Library of Medicine.

Correction of the scientific literature represents a challenging and dynamic aspect of journal publishing. As research becomes more collaborative and statistical methods grow more complex, pervasive correction of published research could play an increasingly important part of the peer review and publication process, but stakeholder engagement remains crucial<sup>19</sup>.

### Conflicts of interest

All authors are employees of *The Lancet* group of journals, an Elsevier publication. HC is a board member of *European Science Editing*. AJ is *The Lancet* representative to ICMJE.

### Contributions

EG and DS are editors of *The Lancet Respiratory Medicine*. RH, AJ, SK, and HW are editors of *The Lancet*. LP is Senior Deputy Managing Editor of *The Lancet* journals. HC and ZN copyedited the retracted and republished articles. HC drafted the first version of this manuscript. All authors critically revised this manuscript.

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