

Biostatisticians are available to support staff undertaking research at Barwon Health. However, in many cases the contribution made by a biostatistician may warrant co-authorship. All researchers are required to consider established authorship guidelines in determining authorship, including the [Barwon Health Guidelines for Collaborative Research and Authorship](#), and it is recommended that the role of the biostatistician is discussed and clarified at the beginning of a collaboration.

The role of the biostatistician and his/her contribution varies across different projects. Determining whether a statistical consultant should/could be a co-author should be negotiated on a case-by-case basis. Current internationally recognised guidelines advise that authorship should be based on the level of participation and should not be influenced by whether or not the consultant was paid. The basis for financial support and authorship are different as the former considers the time and effort put into the project whilst the latter relies on intellectual input. The following internationally recognised guidelines should be seen as recommendations that may be helpful in determining co-authorship.

According to the International Committee of Medical Journal Editors ([ICMJE Updated Recommendations, December 2018](#)), all authors should satisfy each of the following four criterion:

1. a) substantial contributions to conception and design *or*
 b) the acquisition, analysis or interpretation of data from the work
2. a) drafting the work *or*
 b) revising it critically for important intellectual content
3. a) final approval of the version to be published
4. a) agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conditions 1, 2, 3 and 4 must all be met.

In addition to accountability for the parts of the work undertaken, an author should be able to identify which co-authors are responsible for specific other parts of the work. In addition, authors should have confidence in the integrity of the contributions of their co-authors. All those designated



as authors should meet all four criteria for authorship, and all who meet the four criteria should be identified as authors.

Considering a Biostatistician as a co-author: In keeping with the above guidelines, if the statistician participating in the study performs some activity in each of categories 1 and 2 above and also satisfies 3. and 4. then his or her contribution should be acknowledged as co-authorship. The most common contributions made by biostatisticians to projects, reports or manuscripts include:

- advising and collaborating on the design of the study (including determining the appropriate sample size),
- analysing the data collected, and interpreting the results for and with the principal investigator(s).
- writing the statistical methods section of the manuscript (or editing versions drafted by other investigators).
- writing and/or revising drafts of some or all of the results section.
- drafting or editing tables and figures in the manuscript.
- developing new statistical methods to meet the project's needs, and/or combining existing techniques in a novel manner.
- reviewing/providing critical analysis of drafts

Furthermore, some journals require that at least one author be responsible for each section of the manuscript that is essential to the conclusions made about the research. Therefore, if the statistician is not listed as a co-author, then one or more of the authors must take responsibility for the statistical analysis.

