The ARRIVE reporting guideline writing guide

For writing impactful articles describing *in vivo* animal experiments that can be understood and used by a wide audience.

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| Note |
| If you have not used a writing guide before, read about our suggested [writing process](https:/jamesrharwood.github.io/equator-guidelines-website/about/writing-using-reporting-guidelines.html).  This guide is not a template. Don’t expect to fill it in and end up with a finished article. Instead, think of it as an exercise book.   1. Collate information and make notes in this guide; 2. Delete the prompts and headings, reorganise your notes into a narrative structure, moving content to tables, figures, or appendices when appropriate, thereby creating a writing outline. 3. Draft, revise, and edit your text in a separate file, referring to your outline throughout.   Before you begin, double check that ARRIVE is the [most applicable reporting guideline](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/index.html?#applicability) for your work. Other reporting guidelines have their own writing guide.  The [UK EQUATOR Centre training](https:/jamesrharwood.github.io/equator-guidelines-website/training.html) helps researchers develop writing skills and to use reporting guidelines (like this one) to write research articles and applications that are complete, concise, and compelling. It covers many of the items of the ARRIVE reporting guideline, including how to prepare effective abstracts, titles, introduction and discussion sections, as well as how to use writing guides to create writing outlines, how to turn outlines into drafts, and drafts into polished text. |

# Essential 10

## 1. Study Design

### [1a. The groups being compared](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/groups-being-compared.html)

|  |
| --- |
| Things To Consider |
| For each experiment, describe the groups being compared, including control groups. If you did not use a control group, explain why. |

* Make notes here:
* …
* …

### [1b. The experimental unit](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/experimental-unit.html)

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| --- |
| Things To Consider |
| Describe the experimental unit (e.g., a single animal, litter, or cage of animals). |

* Make notes here:
* …
* …

## 2. Sample Size

### [2a. Number of Experimental Units](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/number-of-experimental-units.html)

|  |
| --- |
| Things To Consider |
| Specify the exact number of experimental units allocated to each group, and the total number in each experiment. Also indicate the total number of animals used. |

* Make notes here:
* …
* …

### [2b. Sample Size Justification](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/sample-size-justification.html)

|  |
| --- |
| Things To Consider |
| Explain how the sample size was decided. Provide details of any a priori sample size calculation, if done. |

* Make notes here:
* …
* …

## 3. Inclusion and Exclusion Criteria

### [3a. Inclusion and exclusion criteria](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/inclusion-and-exclusion-criteria.html)

|  |
| --- |
| Things To Consider |
| Describe any criteria used for including or excluding animals (or experimental units) during the experiment, and data points during the analysis. Specify if these criteria were established a priori. If no criteria were set, state this explicitly. |

* Make notes here:
* …
* …

### [3b. Exclusions and Attritions](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/exclusions-and-attritions.html)

|  |
| --- |
| Things To Consider |
| For each experimental group, report any animals, experimental units, or data points not included in the analysis and explain why. If there were no exclusions, state so. |

* Make notes here:
* …
* …

### [3c. Numbers analysed](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/numbers-analysed.html)

|  |
| --- |
| Things To Consider |
| For each analysis, report the exact value of *n* in each experimental group. |

* Make notes here:
* …
* …

## 4. Randomisation

### [4a. Randomisation Use](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/randomisation.html)

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| --- |
| Things To Consider |
| State whether randomisation was used to allocate experimental units to control and treatment groups. If done, provide the method used to generate the randomisation sequence. |

* Make notes here:
* …
* …

### [4b. Confounders](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/confounders.html)

|  |
| --- |
| Things To Consider |
| Describe the strategy used to minimise potential confounders such as the order of treatments and measurements, or animal/cage location. If confounders were not controlled, state this explicitly. |

* Make notes here:
* …
* …

## [5. Blinding/Masking](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/blinding.html)

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| --- |
| Things To Consider |
| Describe who was aware of the group allocation at the different stages of the experiment (during the allocation, the conduct of the experiment, the outcome assessment, and the data analysis). |

* Make notes here:
* …
* …

## 6. Outcome Measures

### [6a. Outcome Measures](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/outcome-measures.html)

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| --- |
| Things To Consider |
| Clearly define all outcome measures assessed (e.g., cell death, molecular markers, or behavioural changes). |

* Make notes here:
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* …

### [6b. Primary Outcome Measure](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/primary-outcome-measure.html)

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| --- |
| Things To Consider |
| For hypothesis-testing studies, specify the primary outcome measure, i.e., the outcome measure that was used to determine the sample size. |

* Make notes here:
* …
* …

## 7. Statistical Methods

### [7a. Statistical Methods used for each Analysis](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/statistical-methods-analysis-methods.html)

|  |
| --- |
| Things To Consider |
| Provide details of the statistical methods used for each analysis, including software used. |

* Make notes here:
* …
* …

### [7b. Statistical Assumptions](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/statistical-methods-assumptions.html)

|  |
| --- |
| Things To Consider |
| Describe any methods used to assess whether the data met the assumptions of the statistical approach, and what was done if the assumptions were not met. |

* Make notes here:
* …
* …

## 8. Experimental Animals

### [8a. Species-appropriate Details](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/experimental-animals-species-appropriate-details.html)

|  |
| --- |
| Things To Consider |
| Provide species-appropriate details of the animals used, including species, strain and substrain, sex, age or developmental stage, and, if relevant, weight. |

* Make notes here:
* …
* …

### [8b. Further Information](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/experimental-animals-further-information.html)

|  |
| --- |
| Things To Consider |
| Provide further relevant information on the provenance of animals, health/immune status, genetic modification status, genotype, and any previous procedures. |

* Make notes here:
* …
* …

## 9. Experimental Procedures

### [9a. What was done](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/experimental-procedures-what-was-done.html)

|  |
| --- |
| Things To Consider |
| What was done, how it was done, and what was used. |

* Make notes here:
* …
* …

### [9b. When and how often procedures were conducted](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/experimental-procedures-when-and-how-often.html)

|  |
| --- |
| Things To Consider |
| For each experimental group, including controls, describe **when and how often** procedures were performed. |

* Make notes here:
* …
* …

### [9c. Where procedures were conducted](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/experimental-procedures-where.html)

|  |
| --- |
| Things To Consider |
| For each experimental group, including controls, describe **where** procedures were conducted (including detail of any acclimatisation periods). |

* Make notes here:
* …
* …

### [9d. Why procedures were done](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/experimental-procedures-why.html)

|  |
| --- |
| Things To Consider |
| For each experimental group, including controls, describe **why** procedures were conducted. |

* Make notes here:
* …
* …

## 10. Results

### [10a. Summary/Descriptive Statistics per group](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/results-summary-per-group.html)

|  |
| --- |
| Things To Consider |
| For each experiment conducted, including independent replications, report a summary/descriptive statistics for each experimental group, with a measure of variability where applicable (e.g., mean and SD, or median and range). |

* Make notes here:
* …
* …

### [10b. Effect sizes and confidence intervals](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/results-effect-sizes.html)

|  |
| --- |
| Things To Consider |
| For each experiment conducted, including independent replications, report the effect size with a confidence interval, if applicable. |

* Make notes here:
* …
* …

# Recommended Set

## [11. Abstract](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/abstract.html)

|  |
| --- |
| Things To Consider |
| Provide an accurate summary of the research objectives, animal species, strain and sex, key methods, principal findings, and study conclusions. |

* Make notes here:
* …
* …

## 12. Background

### [12a. Rationale](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/rationale.html)

|  |
| --- |
| Things To Consider |
| Include sufficient scientific background to understand the rationale and context for the study, and explain the experimental approach. |

* Make notes here:
* …
* …

### [12b. Species and model](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/species-and-model.html)

|  |
| --- |
| Things To Consider |
| Explain how the animal species and model used address the scientific objectives and, where appropriate, the relevance to human biology. |

* Make notes here:
* …
* …

## [13. Objectives](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/objectives.html)

|  |
| --- |
| Things To Consider |
| Clearly describe the research question, research objectives and, where appropriate, specific hypotheses being tested. |

* Make notes here:
* …
* …

## [14. Ethical statement](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/ethical-statement.html)

|  |
| --- |
| Things To Consider |
| Provide the name of the ethical review committee or equivalent that has approved the use of animals in this study and any relevant licence or protocol numbers (if applicable). If ethical approval was not sought or granted, provide a justification. |

* Make notes here:
* …
* …

## [15. Housing and husbandry](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/housing-husbandry.html)

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| --- |
| Things To Consider |
| Provide details of housing and husbandry conditions, including any environmental enrichment. |

* Make notes here:
* …
* …

## 16. Animal Care and Monitoring

### [16a. Reducing pain, suffering, and distress](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/reducing-pain-suffering-distress.html)

|  |
| --- |
| Things To Consider |
| Describe any interventions or steps taken in the experimental protocols to reduce pain, suffering, and distress. |

* Make notes here:
* …
* …

### [16b. Adverse events](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/adverse-events.html)

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| --- |
| Things To Consider |
| Report any expected or unexpected adverse events. |

* Make notes here:
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* …

### [16c. Humane endpoints](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/humane-endpoints.html)

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| --- |
| Things To Consider |
| Describe the humane endpoints established for the study, the signs that were monitored, and the frequency of monitoring. If the study did not set humane endpoints, state this. |

* Make notes here:
* …
* …

## 17. Interpretation/ scientific implications

### [17a. Interpretation/scientific implications](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/interpretation-implications.html)

|  |
| --- |
| Things To Consider |
| Interpret the results, taking into account the study objectives and hypotheses, current theory, and other relevant studies in the literature. |

* Make notes here:
* …
* …

### [17b. Limitations](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/limitations.html)

|  |
| --- |
| Things To Consider |
| Comment on the study limitations, including potential sources of bias, limitations of the animal model, and imprecision associated with the results. |

* Make notes here:
* …
* …

## [18. Generalisability/translation](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/generalisability.html)

|  |
| --- |
| Things To Consider |
| Comment on whether, and how, the findings of this study are likely to generalise to other species or experimental conditions, including any relevance to human biology (where appropriate). |

* Make notes here:
* …
* …

## [19. Protocol registration](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/protocol-registration.html)

|  |
| --- |
| Things To Consider |
| Provide a statement indicating whether a protocol (including the research question, key design features, and analysis plan) was prepared before the study, and if and where this protocol was registered. |

* Make notes here:
* …
* …

## [20. Data Access](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/data-access.html)

|  |
| --- |
| Things To Consider |
| Provide a statement describing if and where study data are available. |

* Make notes here:
* …
* …

## 21. Declaration of interests

### [21a. Conflicts of interests](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/conflicts-of-interests.html)

|  |
| --- |
| Things To Consider |
| Declare any potential conflicts of interest, including financial and nonfinancial. If none exist, this should be stated. |

* Make notes here:
* …
* …

### [21b. Funding](https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/items/funding.html)

|  |
| --- |
| Things To Consider |
| List all funding sources (including grant identifier) and the role of the funder(s) in the design, analysis, and reporting of the study. |

* Make notes here:
* …
* …

## How to cite

Describe how you used ARRIVE at the end of your Methods section, referencing the resources you used e.g.,

‘We used the ARRIVE reporting guideline(1) to draft this manuscript, and the ARRIVE reporting checklist(2) when editing, included in supplement A’

If you use a reporting checklist, remember to include it as a supplement when publishing so that readers can easily find information and see how you have interpreted the guidance.

1. Sert NP, Hurst V, Ahluwalia A, Alam S, Avey MT, Baker M, et al. The ARRIVE guidelines 2.0: Updated guidelines for reporting animal research. PLOS Biology [Internet]. 2020 Jul;18(7):e3000410. Available from: <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000410>

2. Sert NP, Hurst V, Ahluwalia A, Alam S, Avey MT, Baker M, et al. The ARRIVE reporting checklist. In: Harwood J, Albury C, Beyer J de, Schlüssel M, Collins G, editors. The EQUATOR network reporting guideline platform [Internet]. The UK EQUATOR Centre; 2025. Available from: [https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/arrive-checklist.docx](https://https:/jamesrharwood.github.io/equator-guidelines-website/guidelines/arrive/arrive-checklist.docx)