



National Centre  
for the Replacement  
Refinement & Reduction  
of Animals in Research

# Use and impact of the ARRIVE guidelines: A survey of *in vivo* researchers worldwide

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6<sup>th</sup> World Conference on Research Integrity

Wednesday 5 June 2019, Hong Kong

# The ARRIVE guidelines

## Animal Research: Reporting of *In Vivo* Experiments

The ARRIVE guidelines were developed to improve the reporting of biomedical research using animals.

- Checklist containing key information necessary to describe a study comprehensively and transparently
- Items cover:
  - Internal validity
  - Reproducibility
  - Context/relevance
- Consensus between:
  - Scientists
  - Statisticians
  - Journal editors
  - Research funders



# Endorsement of the ARRIVE guidelines

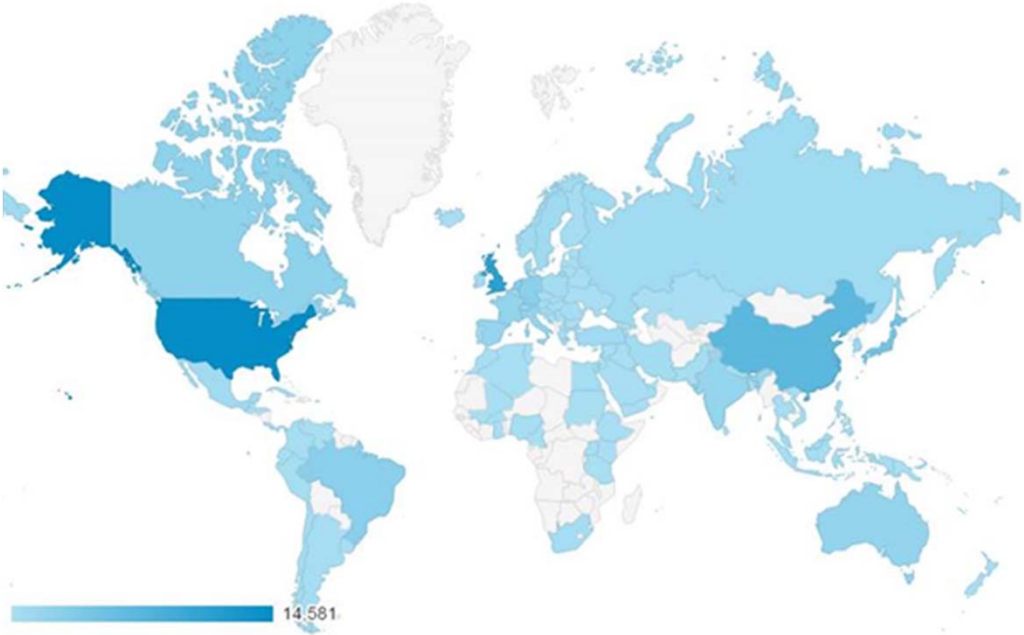
Over **1000** journals and organisations recommend the ARRIVE guidelines

Journals

Funders

Universities

Learned Societies



Over **20,000** copies requested from **50** different countries

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

# The Researchers' View of Scientific Rigor—Survey on the Conduct and Reporting of *In Vivo* Research

Thomas S. Reichlin, Lucile Vogt, Hanno Würbel

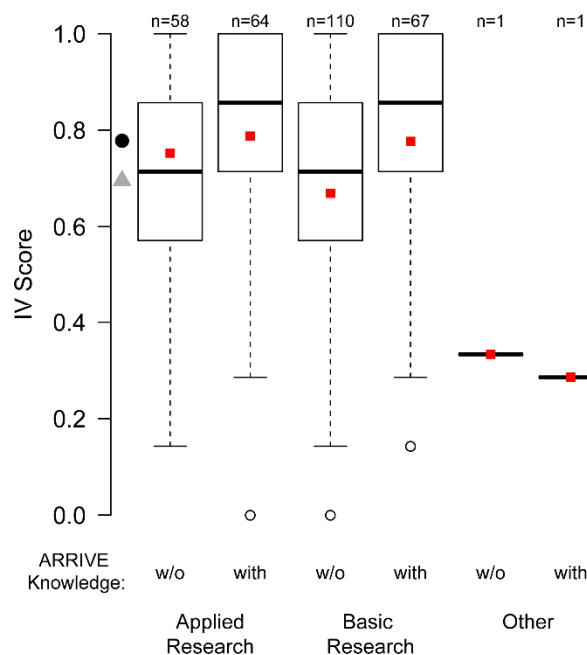
Published: December 2, 2016 • <https://doi.org/10.1371/journal.pone.0165999>

|               |               |
|---------------|---------------|
| 36<br>Save    | 8<br>Citation |
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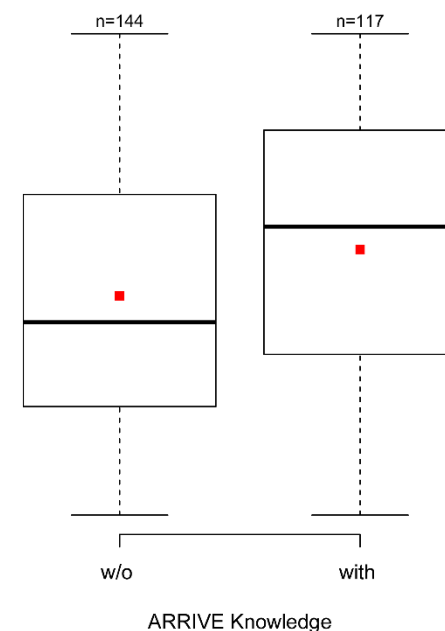
## Internal Validity (IV) Score:

- Allocation concealment
- Blinding
- Randomisation
- Sample size calculation
- Incl/excl criteria
- Primary outcome
- Statistical analysis plan

A) Experimental Conduct



B) Publications

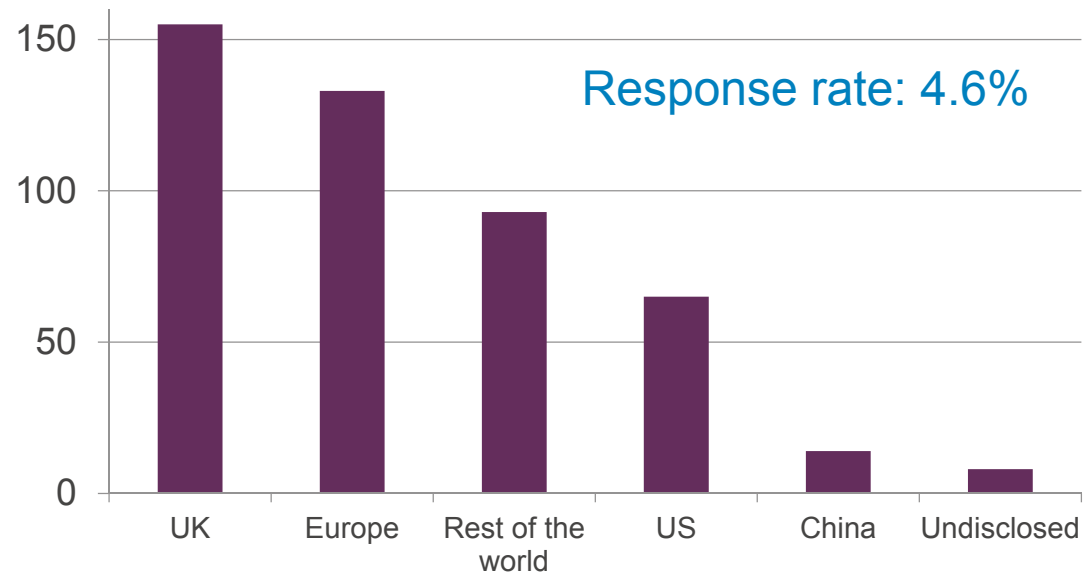
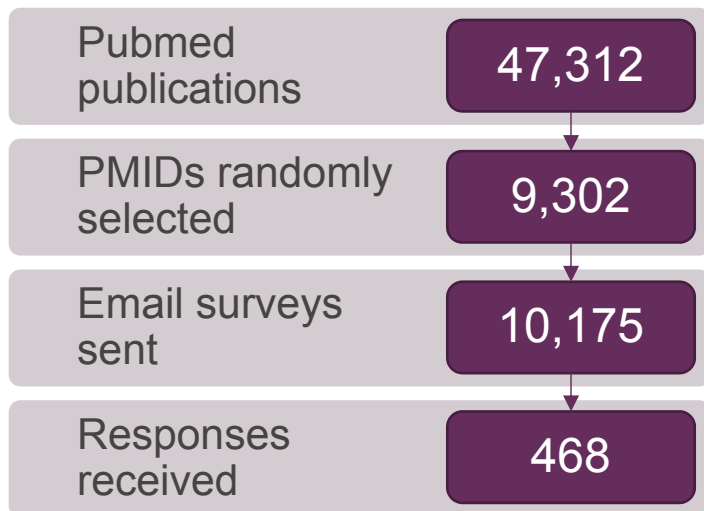


# International survey of *in vivo* researchers

**Objective 1:** To test whether knowledge of the ARRIVE guidelines is associated with more rigorous experimental conduct

**Objective 2:** To inform the revision and understand how the ARRIVE guidelines are used, and why certain items are not reported or checked for by reviewers

- Three sections: Questions about Reporting, Conduct and Review of experiments
- Preregistered on the OSF <https://osf.io/g8t5q>



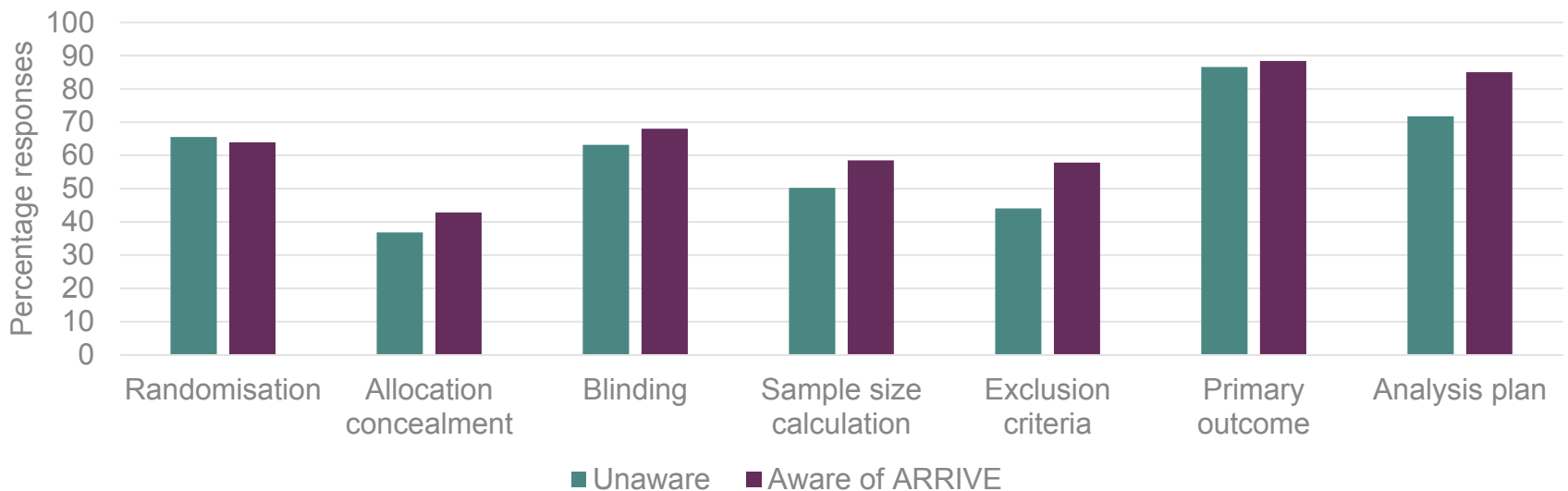
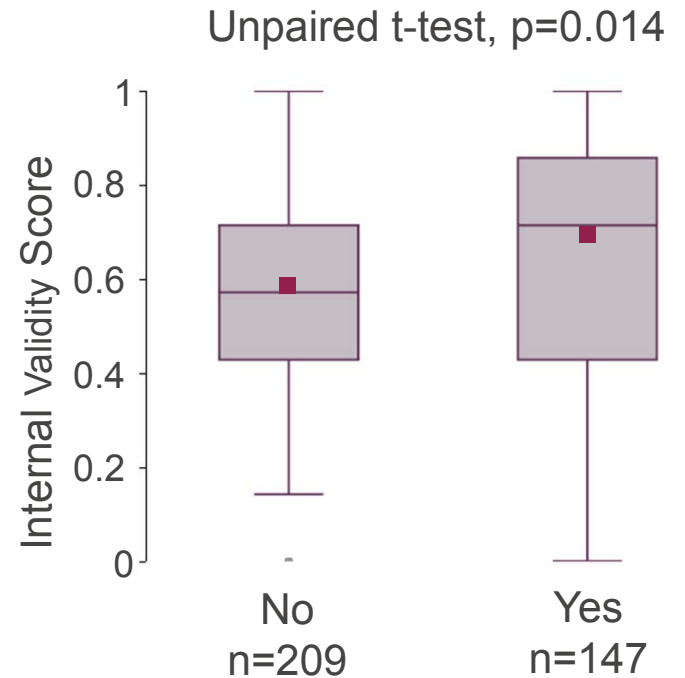
# Results – objective 1

## ARRIVE guidelines and experimental conduct

Complete surveys: n=356

Effect size [95% CI]: 0.07 [0.01-0.12]

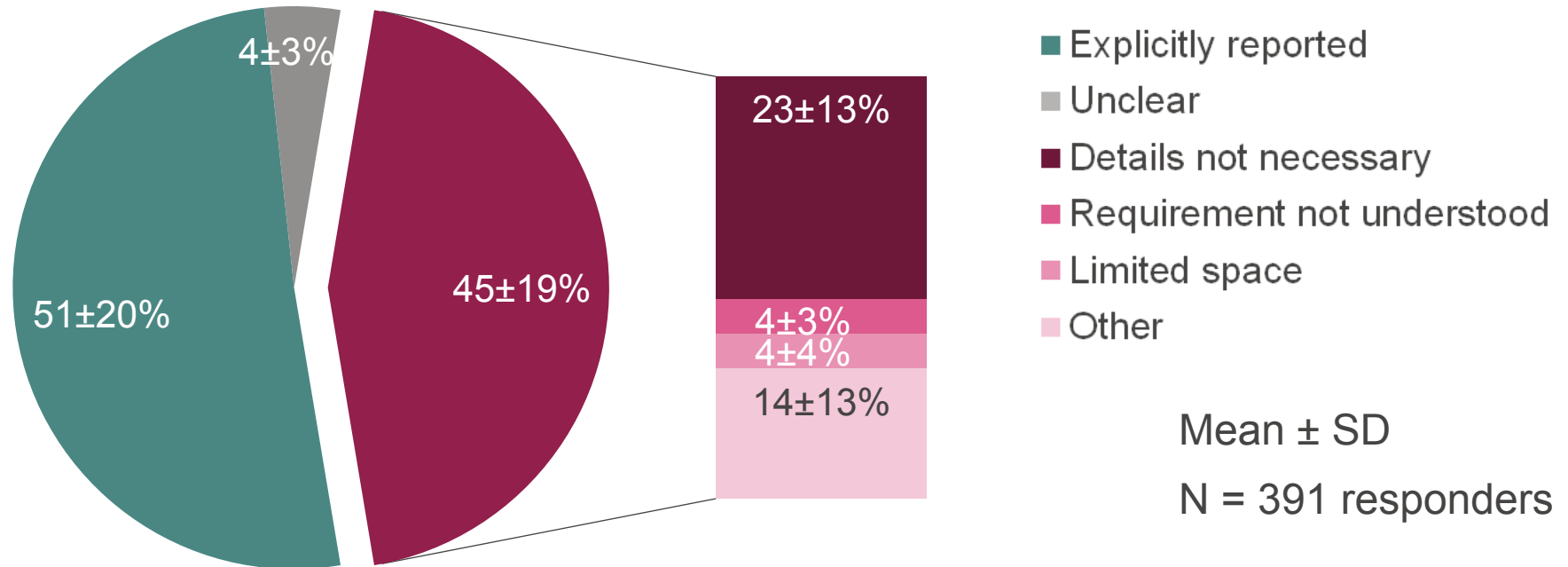
**Knowledge of the ARRIVE guidelines is associated with more rigorous study design**



# Results – Objective 2

## Reason for not reporting information covered in the ARRIVE guidelines

- 13 questions about information reported in latest publication
- Including: measures to reduce bias, experimental design, scientific and 3Rs implications, baseline data, etc.



# Revision of the ARRIVE guidelines: rationale and scope

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## ABSTRACT

In 2010, the NC3Rs published the ARRIVE guidelines to improve the reporting of animal research. Despite considerable levels of support from the scientific community, the impact on the quality of reporting in animal research publications has been limited. This position paper highlights the strategy of an expert working group established to revise the guidelines and facilitate their uptake. The group's initial work will focus on three main areas: prioritisation of the ARRIVE items into a tiered system, development of an explanation and elaboration document, and revision of specific items.

Scientists, funders and the public are increasingly concerned about the reproducibility of research, including studies that do not report the reasons for failing to replicate the results and findings of a study. This is a global problem, ranging, a lack of transparency stemming from poor reporting clearly contributes to the problem.<sup>2</sup> The NC3Rs

assess the rigour and validity of the proposed research.<sup>5</sup>

Have the guidelines improved reporting? In the 7 years since the ARRIVE guidelines were published, researchers have sought to measure the impact of the guidelines on the quality of reporting,<sup>6,7</sup> with mixed results. A recent randomised controlled trial in PLOS ONE<sup>8</sup> showed that mandating the completion of an ARRIVE checklist with manuscript submission, with no additional emphasis on reporting during the editorial process, did not improve adherence to the guidelines in published papers. While these results are disappointing to those seeking immediate change, this study provides an evidence base to improve the guidelines, and ultimately the rigour and reproducibility of animal studies.

In the light of methodological advances in science and experience with the guidelines

- Objectives:
- Update the guidelines
  - Facilitate their uptake



# The ARRIVE guidelines 2019

## ARRIVE Essential 10

|    |                                  |
|----|----------------------------------|
| 1  | Study design                     |
| 2  | Sample size                      |
| 3  | Inclusion and exclusion criteria |
| 4  | Randomisation                    |
| 5  | Blinding                         |
| 6  | Outcome measures                 |
| 7  | Statistical methods              |
| 8  | Experimental animals             |
| 9  | Experimental procedures          |
| 10 | Results                          |

## Recommended Set

|    |  |
|----|--|
| 11 | Ethical statement                        |
| 12 | Housing and husbandry                    |
| 13 | Animal care and monitoring               |
| 14 | Abstract                                 |
| 15 | Background                               |
| 16 | Objectives                               |
| 17 | Interpretation / scientific implications |
| 18 | Generalisability / translation           |
| 19 | Protocol registration                    |
| 20 | Data access                              |
| 21 | Declaration of interests                 |

1. Items reorganised, prioritised in 2 sets
2. New items
3. Explanation and Elaboration

**NC  
3R<sup>s</sup>**

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## Further information

[www.nc3rs.org.uk/ARRIVE](http://www.nc3rs.org.uk/ARRIVE)

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