How to write a scientific paper

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CONFLICT OF INTEREST DISCLOSURE

Potential conflict of interest
- Editor-in-Chief of Age and Ageing 2014-present

Additional credentials
- Author of >200 peer review publications
  - Clinical geriatrics and gerontology
  - RCTs, observational studies, cohort studies, mendelian randomisation studies, diagnostic test accuracy studies, prognostic studies, qualitative research
- Practising consultant geriatrician in urban teaching hospital
Information resources – research methods
http://www.equator-network.org/
Enhancing the QUALity and Transparency Of health Research

Reporting guidelines for main study types

• Randomised trials - CONSORT + Extensions
• Observational studies - STROBE + Extensions
• Systematic reviews - PRISMA + Extensions
• Diagnostic / prognostic studies - STARD + TRIPOD
• Quality improvement studies - SQUIRE

375 reporting guidelines!
Key steps in writing a paper – firstly decide your target journal!

• Study protocol
• Trial registration
• A priori statistical analysis plan
  • Power calculations, pre-specified primary outcome
• Statistical analysis
  • Intention to treat
• Preparation of data for publication
  • Tables, figures, text
• Abstract
• Introduction, methods, discussion
• Referencing
• Declaration of COI, funding

• Authorship
  • Lead / corresponding author
  • Senior author
  • Co-authors (specified contribution)
  • Order of authors

• Acknowledgments
Some general points

• Use spelling and grammar checker
• Read what you have written!
• Avoid acronyms
• Strive for internal consistency
  • Order of argument, use of language, data presented
• Be honest about limitations
• Avoid over-interpretation of data / giving conclusions that are not justified by the findings
• Follow journal instructions to authors
Common ethical issues

• Segmented (‘salami’) publication
  • Single study split into several segments just large enough to gain reasonable results and conclusions

• Duplicate publication
  • Paper that overlaps substantially with one or more already published
  • Particular problem if no clear, visible reference to the previous publication(s)

• Journal process
  • Routine plagiarism checks e.g. iThenticate for all papers that are potentially suitable for publication
Introduction

• Background
  • Scientific background and explanation of rationale

• Objectives
  • Specific objectives or hypotheses
Methods

• Trial Design
  • eg parallel group / factorial / cluster RCT – include allocation ratio
  • Changes after trial commencement

• Participants
  • Eligibility criteria

• Study settings

• Interventions
  • Sufficient detail to allow replication

• Outcomes
  • Prespecified primary and secondary outcomes including how and when they were assessed
  • Changes to outcomes

• Sample size

• Interim analyses / stopping guidelines

• Randomisation
  • Type (restriction? – eg block, stratified, minimisation), allocation concealment, implementation

• Blinding
  • Participants, care providers, outcome assessors

• Statistical methods

http://www.consort-statement.org/checklists/view/32--
consort-2010/69-background
Results

• Participant flow
  • Numbers randomised, who received intended treatment, and analysed for primary outcome

• Losses and exclusions
  • Reasons

• Recruitment
  • Dates

• Reason for stopped trial

• Baseline data table

• Numbers analysed

• Outcomes and estimation
  • For each primary and secondary outcome results for each group, and the estimated effect size and precision (eg 95% CI)
  • For binary variables give both absolute and relative effect sizes
  • Ancillary analyses – subgroups, adjusted analyses – state if pre-specified or exploratory

• Harms

http://www.consort-statement.org/checklists/view/32--consort-2010/69-background
Study data - Simplified patient flow chart (CONSORT)

RCT – table 1
Baseline characteristics – can you spot 5 weaknesses?

<table>
<thead>
<tr>
<th></th>
<th>All (n=737)</th>
<th>Placebo (n=369)</th>
<th>Levothyroxine (n=368)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) [Mean, SD and range]</td>
<td>74.48 (6.32) [65.1-93.4]</td>
<td>74.82 (6.83) [65.1-93.4]</td>
<td>74.0 (5.8) [65.2-93.0]</td>
<td>0.86</td>
</tr>
<tr>
<td>Female sex</td>
<td>396 (53.7%)</td>
<td>198 (53.7%)</td>
<td>198 (53.8%)</td>
<td>0.75</td>
</tr>
<tr>
<td>Current smokers</td>
<td>62 (8.42%)</td>
<td>33 (8.91%)</td>
<td>29 (7.90%)</td>
<td>0.68</td>
</tr>
<tr>
<td>Number of concomitant medicines [median, IQR]</td>
<td>4.0 (2.0, 6.0)</td>
<td>4.0 (2.0, 6.0)</td>
<td>4.0 (2.0, 6.0)</td>
<td>0.89</td>
</tr>
<tr>
<td>EuroQol-5D</td>
<td>0.847 (0.179)</td>
<td>0.847 (0.171)</td>
<td>0.846 (0.187)</td>
<td>0.76</td>
</tr>
<tr>
<td>Weight &lt;50Kg</td>
<td>10 (1.4%)</td>
<td>5 (1.4%)</td>
<td>5 (1.4%)</td>
<td>0.90</td>
</tr>
<tr>
<td>TSH (mU/L) [Mean, SD and range]</td>
<td>6.40 (2.01) [4.6-17.6]</td>
<td>6.38 (2.01) [4.6-17.6]</td>
<td>6.41 (2.01) [4.6-17.6]</td>
<td>0.83</td>
</tr>
</tbody>
</table>
RCT – table 1
Baseline characteristics – spot the weaknesses!

• Spurious accuracy
  • Mean age 78.63 years

• Inconsistency in data presentation
  • Mean age different groups 78.42, 78.0 years

• p-values in baseline table of RCT

• Use of acronyms
  • SD, EuroQol-5D, TSH

• Explanation of range of scores, what high and low score mean
Structured discussion

• Statement of principal findings

• Strengths and weaknesses of the study
  • CONSORT – sources of potential bias, imprecision, and if relevant multiplicity of analyses; external validity, applicability

• Strengths and weaknesses in relation to other studies, discussing particularly any differences in results

• Meaning of the study: possible mechanisms and implications for clinicians or policymakers
  • CONSORT – interpretation consistent with the results, balancing benefits and harms, and considering other relevant evidence

• Unanswered questions and future research

Docherty and Smith BMJ 1999;318:1224
Journal response

• Rejection – is it worth appealing?
  • If response suggests misunderstanding by the reviewer / editor or rationale for rejection appears illogical

• Interested – but a raft of amendments suggested
  • Open door for resubmission!
  • Detailed point-by-point response
  • Accede to request for amendment where this seems reasonable
  • Explain if suggested amendments not possible or inappropriate
  • Be respectful in your reply
  • Track changes manuscript
  • Ask for extra time if you need it
  • Keep your co-authors on-board

• Accept without amendment (highly unlikely!)
Good luck!
<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment group</th>
<th>Within-group effect size (Cohen’s $d^b$)</th>
<th>Control group</th>
<th>Within-group effect size (Cohen’s $d^b$)</th>
<th>Between-group difference in change of score or percentage (95% CI)</th>
<th>$P$-value$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHOQOL-BREF (HK)</td>
<td></td>
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<tr>
<td>Self-reported overall QOL$^a$ (Scores 1–5)</td>
<td></td>
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</tr>
<tr>
<td>Baseline</td>
<td>3.49 ± 0.78</td>
<td></td>
<td>3.54 ± 0.79</td>
<td></td>
<td>0.30 (−0.06 to 0.67)</td>
<td>0.105</td>
</tr>
<tr>
<td>12 weeks</td>
<td>3.70 ± 0.64</td>
<td>0.294</td>
<td>3.45 ± 0.71</td>
<td>−0.120</td>
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<tr>
<td>Self-reported General Health$^a$ (Scores 1–5)</td>
<td></td>
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<tr>
<td>Baseline</td>
<td>3.05 ± 0.92</td>
<td></td>
<td>3.30 ± 0.93</td>
<td></td>
<td>0.37 (−0.12 to 0.87)</td>
<td>0.140</td>
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<tr>
<td>12 weeks</td>
<td>3.23 ± 1.06</td>
<td>0.181</td>
<td>3.10 ± 1.14</td>
<td>−0.192</td>
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<tr>
<td>Physical domain (Scores 0–100)</td>
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<tr>
<td>Baseline</td>
<td>55.03 ± 14.42</td>
<td></td>
<td>59.79 ± 14.35</td>
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<tr>
<td>12 weeks</td>
<td>63.49 ± 15.69</td>
<td>0.561</td>
<td>56.52 ± 16.71</td>
<td>−0.210</td>
<td>11.74 (5.01 to 18.47)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Psychological domain (Scores 0–100)</td>
<td></td>
<td></td>
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<tr>
<td>Baseline</td>
<td>63.97 ± 12.02</td>
<td></td>
<td>66.90 ± 12.00</td>
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<tr>
<td>12 weeks</td>
<td>67.91 ± 12.94</td>
<td>0.315</td>
<td>64.89 ± 13.78</td>
<td>−0.156</td>
<td>5.95 (0.20 to 11.70)</td>
<td>0.043*</td>
</tr>
<tr>
<td>Social domain (Scores 0–100)</td>
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<tr>
<td>Baseline</td>
<td>59.89 ± 11.31</td>
<td></td>
<td>65.69 ± 11.28</td>
<td></td>
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<tr>
<td>12 weeks</td>
<td>64.45 ± 10.47</td>
<td>0.418</td>
<td>63.70 ± 11.21</td>
<td>−0.177</td>
<td>6.54 (1.40 to 11.69)</td>
<td>0.013*</td>
</tr>
<tr>
<td>Environment domain (Scores 0–100)</td>
<td></td>
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</tr>
<tr>
<td>Baseline</td>
<td>67.31 ± 10.89</td>
<td></td>
<td>70.78 ± 10.85</td>
<td></td>
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</tr>
<tr>
<td>12 weeks</td>
<td>71.61 ± 11.81</td>
<td>0.379</td>
<td>68.13 ± 12.57</td>
<td>−0.226</td>
<td>6.95 (2.02 to 11.87)</td>
<td>0.006*</td>
</tr>
<tr>
<td>Suffered from daily pain</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Baseline</td>
<td>42%</td>
<td></td>
<td>37%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>12 weeks</td>
<td>30%</td>
<td>−0.243</td>
<td>52%</td>
<td>0.366</td>
<td>−25% (−46% to −12%)</td>
<td>0.022*</td>
</tr>
<tr>
<td>Pain Intensity (Scores 0–10)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>4.60 ± 2.76</td>
<td></td>
<td>4.23 ± 2.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 weeks</td>
<td>3.24 ± 3.04</td>
<td>−0.468</td>
<td>4.67 ± 3.29</td>
<td>0.144</td>
<td>−1.79 (−3.01 to −0.52)</td>
<td>0.006*</td>
</tr>
</tbody>
</table>
Research methods series

- Descriptive statistics; Ruth Pickering
- Systematic reviews; Susie Shenkin
- Randomised controlled trials; Miles Witham and David Stott
- Quality assessment tools; Jenni Harrison
Age and Ageing - summary

• >1000 new submissions / annum
  (+200 resubmissions)
  • Research papers, short reports, systematic reviews, reviews, commentaries, case reports, clinical reminders

• Commissioned articles
  • Editorials, Commentaries, New Horizons

• eletters

• Editor’s view

• Output
  • Printed journal (bi-monthly), on-line, web collections