Practical recommendations for the wider implementation and reporting of sex-specific analyses in medical publications

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EQUATOR: SAGER guidelines

"More impetus is needed for broader implementation"

Background

- Despite strong evidence that biological sex influences treatment efficacy and safety, females remain underrepresented in clinical trials and sex-specific analyses are rarely reported [1–5]
- The Sex and Gender Equity in Research (SAGER) guidelines were published in 2016, aiming to raise awareness of this issue [6]

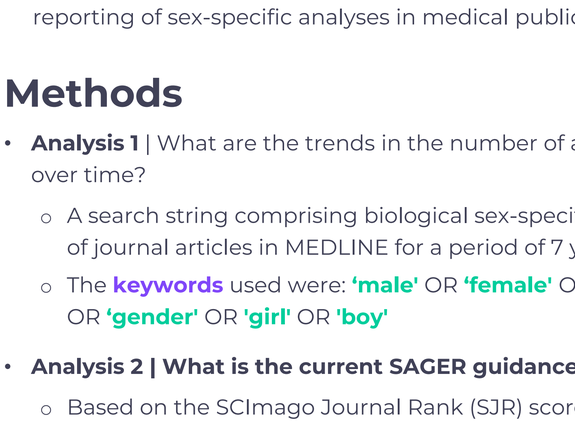
Objective

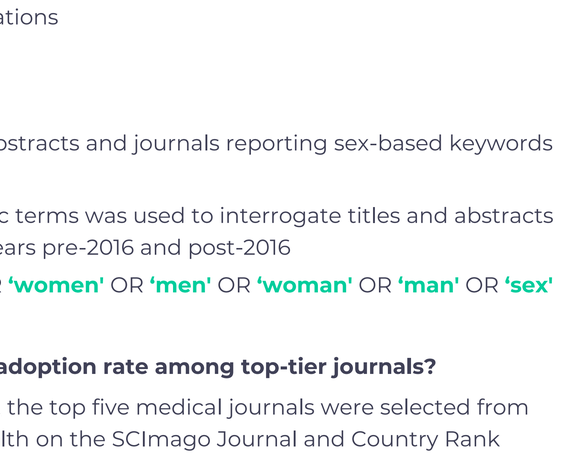
- Here, we review the uptake of the SAGER guidelines and assess their impact on current reporting practices
- The aim is to provide practical recommendations for the wider adoption of these guidelines in the reporting of sex-specific analyses in medical publications

Methods

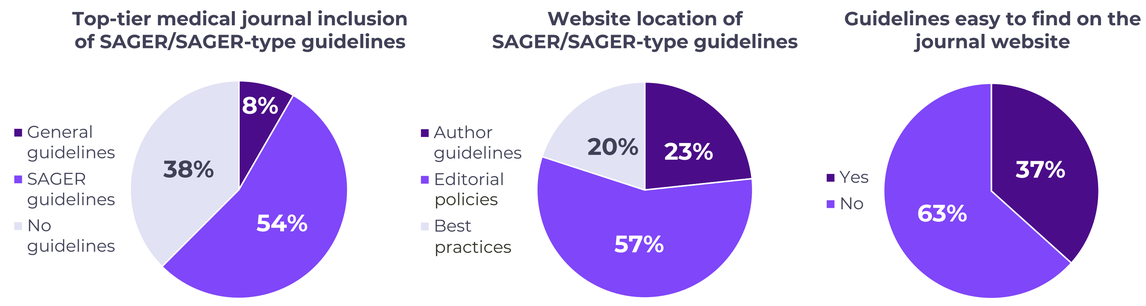
- **Analysis 1** | What are the trends in the number of abstracts and journals reporting sex-based keywords over time?
  - A search string comprising biological sex-specific terms was used to interrogate titles and abstracts of journal articles in MEDLINE for a period of 7 years pre-2016 and post-2016
  - The **keywords** used were: **'male'** OR **'female'** OR **'women'** OR **'men'** OR **'woman'** OR **'man'** OR **'sex'** OR **'gender'** OR **'girl'** OR **'boy'**
- **Analysis 2 | What is the current SAGER guidance adoption rate among top-tier journals?**
  - Based on the SCImago Journal Rank (SJR) score, the top five medical journals were selected from each of the subject areas relevant to human health on the SCImago Journal and Country Rank website [7]
  - The website of each journal was searched for SAGER guidelines (or similar guidelines outlining the need to consider sex-specific analyses) to determine the guideline adoption rate and ease of access among top-tier journals
- **Analysis 3 | What are the current rates of SAGER guideline compliance?**
  - The top 13 journals identified as part of Analysis 1 were filtered to include only those publishing open-access articles and with SAGER/SAGER-type guidelines on their website
  - A checklist based on the SAGER guidelines [6] was used to evaluate the full text of 15 randomly chosen articles published by each of these journals in 2024, to estimate the current level of guideline compliance

Analysis 1. *Trends in the reporting of sex-based keywords in article titles/abstracts*





Analysis 2. *SAGER guideline adoption rate and ease of access among top-tier journals*

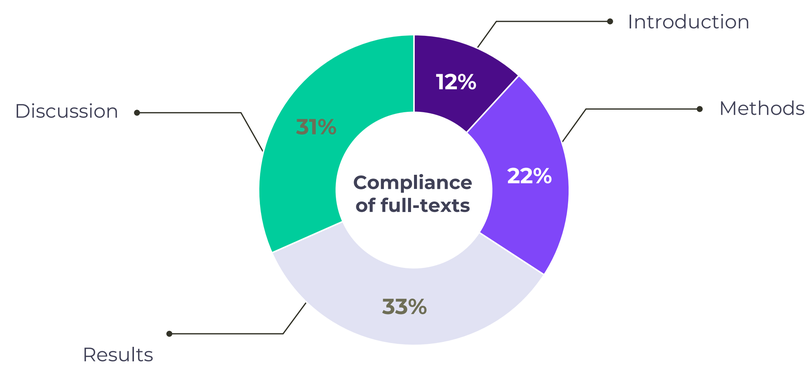


Results

- Despite increasing articles indexed from 2009 to 2023, the proportion of titles/abstracts including sex-specific terms peaked in 2013 at ~58% of all articles and subsequently decreased to the lowest level for this period in 2023 at ~18% **(Analysis 1)**
- Similarly, the proportion of individual journals publishing >50 articles/year with these keywords in the title/abstract decreased **(Analysis 1)**
- A website analysis of top-tier medical journals indicated that 62% provided SAGER/SAGER-type guidelines on the reporting of sex-specific analyses **(Analysis 2)**
- Of these top-tier journals, only 23% provided the guidelines directly on the author guidance webpages, with the majority (57%) describing these under editorial policies instead **(Analysis 2)**
- The SAGER guidelines were easy to find by clicking through to author guidance in the top navigation menus of only 37% of these top-tier journals' websites **(Analysis 2)**, with many journals linking to these instead via the website footer to editorial policy webpages
- Of the top 13 journals identified in Analysis 1 with the highest number of titles/abstracts with the keywords from 2009 to 2023, three provide detailed SAGER guidelines and are open-access
- A random selection of full-text articles published in 2024 by these three open-access journals showed that approximately 1/3rd were at least partially compliant with the SAGER guidelines in the Results and Discussion sections, with lower rates observed in the Introduction and Methods **(Analysis 3)**
- Notably, the two journals that had easily accessible guidelines had ~2-fold higher compliance rates than the one journal that did not

Analysis 3. *SAGER guideline compliance rate in full-text articles*

Basic compliance checklist derived from the SAGER guidelines [6]	
Introduction	Does the INTRODUCTION report whether sex-based differences are/are not expected in the study?
Methods	Do the METHODS report how sex was considered in the design of the study and the analysis of the data?
Results	Do the RESULTS present the data disaggregated by sex, regardless of the presence of any impact of sex (at least for the primary endpoint)?
Discussion	Does the DISCUSSION describe the potential implications of sex on the study results if any sex-based analyses were performed? If not performed, does the DISCUSSION describe the rationale for the lack of such analyses and the potential implications of this on results interpretation?



Conclusions

- Based on these findings, we suggest the below to enable wider adoption of the SAGER guidelines in medical publications:
  - In general, consultations and training are needed in the **pharmaceutical, medical communications, and publishing industries** to highlight the importance of sex-specific analyses in enhancing the quality and relevance of medical data
  - **Funders, research institutions, and industry** can drive the adoption of these guidelines by closely considering the impact of biological sex on medical research in study design and data analyses
  - Educating **patients and advocacy groups** can raise public awareness on the importance of sex-specific research
  - Journals on the leading edge of industry best practices that include these guidelines can be specifically targeted by **authors and funders** for medical publications, and recognised for their efforts in addressing health equity
  - **Journals** can directly describe or link to these guidelines on the author guidance webpages to improve visibility and uptake by authors
  - **Journals** can provide a section-by-section checklist based on these guidelines for authors to complete when submitting their publications
- The above recommendations may provide the needed impetus for broader incorporation of the SAGER guidelines into publication best practices, and build momentum towards reducing bias and promoting greater diversity, equity, and inclusion in medical research

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