

## The AIMS Academy Medical Writing Training for Clinicians and Medical Students: A 3-year Prospective Educational Intervention Study and Survey

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### Abbreviations:

AIMS: Advanced International  
 Mini-Invasive Surgery;  
 SD: standard deviations.

### Rezumat

*Academia AIMS – Program de formare în scrierea academică medicală pentru clinicieni și studenți la medicină: studiu prospectiv, intervențional, pe o perioadă de 3 ani și sondaj de evaluare*

În ciuda importanței sale, capacitatea de a redacta manuscrise științifice de înaltă calitate este adesea percepută ca aparținând exclusiv mediului academic și cercetătorilor. Cursurile tradiționale de scriere academică medicală se concentrează frecvent pe evaluarea critică a articolelor existente, ceea ce poate limita posibilitatea participanților de a dezvolta efectiv un manuscris propriu.

**Material și Metode:** Acesta este un studiu prospectiv, intervențional, nerandomizat, desfășurat pe parcursul a trei ani de cursuri de scriere academică medicală (2022-2024). Fiecare curs a inclus elaborarea unui manuscris, lucru în echipă, revizuire de către experți și un workshop final.

**Rezultate:** Toți cei 18 participanți au contribuit la redactarea unui manuscris clinic, ceea ce a condus la publicarea a trei articole evaluate prin peer-review, acceptate după revizurii minore, cu un timp mediu până la publicare de 85 de zile. Răspunsurile la chestionar (scala Likert cu 10 puncte) au evidențiat un grad ridicat de satisfacție: evaluarea generală a cursului a fost de  $9,0 \pm 0,8$ , îmbunătățirea competențelor de redactare  $8,4 \pm 1,2$ , iar beneficiul adus de implicarea experților  $7,8 \pm 1,5$ . Șaptezeci și doi la sută dintre participanți au raportat o îmbunătățire semnificativă a abilităților de redactare științifică. Toți participanții și-au exprimat disponibilitatea de a participa din nou și de a recomanda cursul.

**Concluzie:** Cursurile de scriere academică, medicală, practică, bazată pe implicare directă, reprezintă un model eficient și reproductibil pentru îmbunătățirea competențelor de redactare științifică în rândul clinicienilor.

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**Cuvinte cheie:** scriere medicală, educație, chirurgie, cercetare

## Abstract

*Background:* Despite its importance, the ability to produce high-quality scientific manuscripts is often perceived as the domain of academics and researchers. Traditional medical writing courses often focus on the critical appraisal of existing articles, which may not let participants develop a manuscript.

*Methods:* A prospective, non-randomized intervention study was conducted over three years medical writing courses (2022–2024). Each course included manuscript drafting, peer collaboration, expert review, and a final workshop.

*Results:* All 18 participants contributed to a clinical manuscript, resulting in three peer-reviewed publications following minor revisions with a mean time to publication of 85 days. Questionnaire responses (10-point Likert scale) showed high satisfaction: overall course rating  $9.0 \pm 0.8$ , skill improvement  $8.4 \pm 1.2$ , and expert benefit  $7.8 \pm 1.5$ . Seventy-two percent reported significant improvement in writing skills. All participants expressed willingness to attend again and recommend the course.

*Conclusions:* Hands-on medical writing is an effective, replicable model for improving medical writing skills among clinicians.

**Keywords:** medical writing, education, surgery, research

## Introduction

The advancement of medical and surgical treatments hinges on the ability to question and refine established paradigms. This iterative process, rooted in critical thinking and evidence-based evaluation, is fundamental to driving innovation in clinical practice (1,2). As medical professionals engage in daily challenges that push the boundaries of existing knowledge, their insights hold the potential to significantly enrich global healthcare practices. However, the true value of these experiences is realized only when they are systematically documented, analyzed, and shared with the broader medical community through the literature. Without effective communication of these contributions, their impact on professional growth and the advancement of medical science remains limited. Scientific writing is an essential skill for translating clinical observations and research into knowledge that informs medical progress (3-5).

Writing a scientific article facilitates the dissemination of clinical findings, fosters peer engagement, and ensures the integration of novel insights into the medical canon. Despite its importance, the ability to produce high-quality scientific manuscripts is often perceived as the domain of academics and researchers (6). Recent studies have noted that many clinicians, residents, and medical students find medical writing daunting, citing difficulties in structuring research, insufficient guidance, decreased financial support,

reduced clinical demand and incentives, and excessive administrative burden as significant obstacles, resulting in an underutilization of their valuable experiences and perspectives (7-9). For instance, a study of surgical residents reported that over 47% never published a manuscript, while another study reported that only 8% of general surgery residency programs gave a role to research (10,11).

The barriers to scientific writing are multifaceted. They include limited exposure to manuscript preparation during medical training, inadequate understanding of scientific language and structure, lack of mentorship, and the perception that medical writing is an overwhelming and inaccessible task (6,7,12,13).

Furthermore, traditional medical writing courses often focus on the critical appraisal of existing articles, which, while informative, may not fully equip participants with the skills needed to independently develop and submit a manuscript (14-18). These limitations highlight the need for innovative approaches to medical writing education that prioritize hands-on experience and practical application.

Recognizing these challenges, the Advanced International Mini-Invasive Surgery (AIMS) Academy Clinical Research Network developed a course model designed to actively engage participants in the process of manuscript creation and submission. Unlike conventional courses, this model emphasizes practical

learning by assigning participants to collaboratively draft, revise, and submit a clinical manuscript to a peer-reviewed journal. This approach not only enhances medical writing skills but also fosters a sense of ownership and motivation by positioning participants as co-authors of the resulting publication.

The aim of this study was to evaluate the effectiveness of the AIMS Academy hands-on medical writing course in enhancing participants' scientific writing skills, satisfaction, and publication success.

## Material and Methods

Between 2022 and 2024, three sessions of the AIMS Academy Clinical Research Network medical writing courses were conducted. The objective was to provide practical medical writing training by guiding participants through the composition of a manuscript intended for peer-reviewed publication.

### *Participant Selection*

Each course included six trainees recruited from six surgical centers in the AIMS Academy Clinical Research Network across Italy (e.g., Desio Hospital, Niguarda Hospital). Recruitment involved an open call via email and network announcements, with applications reviewed for eligibility by the AIMS scientific committee. From around 12 applicants for each year, six were selected per course based on eligibility criteria via a blinded review process. Eligibility criteria included base involvement in scientific publications (at least one prior publication or abstract), certified proficiency in English (e.g., TOEFL/IELTS score or equivalent), and the ability to independently draft an initial version of a scientific article (assessed via a submitted writing sample). No random selection was used.

### *Ethics Approval*

This study was approved by the Institutional Review Board of Niguarda Hospital, Milan, Italy. All participants provided written informed consent.

### *Course Structure*

The AIMS network scientific committee predetermined the topic and title of the manuscript, using pre-analyzed data from the database of the AIMS academy network. Sections were assigned randomly via a draw conducted by the AIMS scientific committee to ensure fairness. Participants drafted specific

sections to simulate collaborative authorship in real-world research, fostering teamwork while allowing focused skill development: introduction, materials and methods, results, discussion (data interpretation and comparison with the literature), and/or references. All sections were then publicly reviewed so that all participants could learn from mistakes.

Each participant had one month to submit their draft section. A designated AIMS network member subsequently compiled these sections into a single draft and created an abstract, which were reviewed by an invited medical writing expert. The medical writing expert was a board-certified professional with over 30 years of experience in scientific publishing (prior roles as editor for journals, H-index >70, >450 publications, had domain expertise in surgical research, aligned with manuscript topics, all of which was validated via curriculum vitae review by the AIMS committee. All the course participants were listed as authors of the article they participated in. Authorship was assigned per ICMJE criteria: all participants contributed substantially to drafting/revising, approved the final version, and agreed to be accountable for all aspects through group discussions and revisions.

### *Practical Workshop*

A one-day workshop was conducted one month after the submission of the draft to the expert. During the eight-hour session, participants presented their sections, explained their writing decisions, and engaged in group review and revision under the guidance of the medical writing expert. The expert provided objective feedback to each section during the workshop, incorporated into revisions. The manuscript was finalized for submission to a peer-reviewed journal, and all participants were credited as co-authors. One participant from each course was collectively assigned the role of corresponding author on a random basis. Revisions were performed collectively via e-mail by all the participants.

### *Evaluation Metrics*

Participants completed a post-course questionnaire (6 months after the workshop) using a 10-point Likert scale (1 = not at all, 10 = extremely) to assess their experiences. The questionnaire assessed satisfaction, skill improvement, and engagement (see *Table 1*). It was developed based on existing validated tools (e.g., adapted from Kirkpatrick's evaluation model) and pilot-tested for face validity among 5 non-participants;

**Table 1.** Results of the post-course questionnaire given to the participants

Questions with Likert scale (1-10) results, n (%)	Participants N=18	Mean score $\pm$ SD
Did you feel involved in the work?		9.4 $\pm$ 0.8
10	11 (61)	
9	4 (22)	
8	3 (17)	
Were you proactive in the discussion?		9.2 $\pm$ 0.8
10	7 (39)	
9	7 (39)	
8	4 (22)	
Did you learn something new about the topic that was discussed?		9.2 $\pm$ 0.8
10	7 (39)	
9	7 (39)	
8	4 (22)	
Did your medical writing skills improve?		8.7 $\pm$ 1.2
10	5 (28)	
9	8 (44)	
7	5 (28)	
Did you perceive the corrections received as a discredit?		2.0 $\pm$ 0.6
3	3 (17)	
2	12 (67)	
1	3 (17)	
Was the presence of the medical writing expert useful?		8.0 $\pm$ 1.3
10	5 (28)	
8	3 (17)	
7	10 (56)	
Did knowing that you were part of the writing of the article make you more involved in the work?		8.9 $\pm$ 1.2
10	8 (44)	
9	5 (28)	
7	5 (28)	
Would you be happy if the article were published?		10.0 $\pm$ 0
10	18 (100)	
Was the course useful?		9.0 $\pm$ 0.6
10	3 (17)	
9	12 (67)	
8	3 (17)	
Would you propose the course to your peers?		10.0 $\pm$ 0
10	18 (100)	
Would you participate in the course again?		10.0 $\pm$ 0
10	18 (100)	

reliability was assessed via Cronbach's alpha (0.82). Publication of the prepared manuscripts served as an additional outcome measure.

### Statistical Analysis

Questionnaire responses were summarized using descriptive statistics, including means and standard deviations (SD). No inferential statistics were performed due to the small sample size and descriptive nature of the study.

## Results

All 18 participants successfully completed their assignments and actively engaged in the workshop. Each course concluded within the planned eight-hour duration.

### Questionnaire Results

Table 1 illustrates the results and the mean (SD) scores of the answers. Participant's perception of involvement was high, as 61% (11/18) reported a score of 10, 22% (4/18) gave a score of 9, and 17% (3/18) rated it 8 (mean 9.4  $\pm$  0.7). Proactive participation in group discussions was also high, with 39% (7/18) scoring it 10, another 39% (7/18) scoring it 9, and 22% (4/18) scoring it 8 (mean 9.2  $\pm$  0.8).

In terms of knowledge acquisition on the discussed topic, 39% (7/18) of participants scored their learning as 10, 39% (7/18) rated it 9, and 22% (4/18) gave a score of 8 (mean 9.2  $\pm$  0.8). Medical writing skills improvement was rated as 10 by 28% (5/18), 9 by 44% (8/18), and 7 by 28% (5/18) (mean 8.4  $\pm$  1.2). The perception of corrections as discrediting was minimal, with 67% (12/18) rating it as 2, 17% (3/18) rating it as 3, and 17% (3/18) rating it as 1 (mean 1.8  $\pm$  0.7).

The presence of a medical writing expert was deemed beneficial, with 28% (5/18) rating it 10, 17% (3/18) rating it 8, and 56% (10/18) rating it 7 (mean 7.8  $\pm$  1.5). Involvement due to being listed as an author was scored 10 by 44% (8/18), 9 by 28% (5/18), and 7 by 28% (5/18) (mean 8.8  $\pm$  1.3). When asked if they wanted the manuscript to be published, all participants (100%, 18/18) scored this question as 10.

The course usefulness was highly rated, with 17% (3/18) of participants scoring it 10, 67% (12/18) scoring it 9, and 17% (3/18) scoring it 8 (mean 9.0  $\pm$  0.8). All participants (100%, 18/18) expressed a willingness to attend the course again and to recommend it to their peers.

### Publication Outcomes

All three courses resulted in manuscripts that were successfully published in PubMed-indexed journals (Chirurgia, impact factor 0.8; Updates in Surgery, impact factor 2.5; European Journal of Surgical Oncology, impact factor 3.2) following minor revisions. The time from submission to publication was 98 days for the first manuscript, 85 days for the second, and 73 days for the third, showing a decreasing trend (mean 85 days) (19–21).

## Discussion

Relative to the aim of the study to evaluate the effectiveness of the AIMS Academy course, key findings include high participant satisfaction (mean overall rating  $9.0 \pm 0.8$ ), self-reported skill improvements (mean  $8.4 \pm 1.2$ ), and 100% publication success for the three manuscripts, with a mean time to publication of 85 days. All 18 participants completed the course and expressed intent to recommend it.

The demand for continuous professional development in medicine underscores the importance of medical writing skills. While traditionally associated with academic careers, these skills are equally crucial for clinicians involved in direct patient care (6,22). Despite this, many clinicians refrain from manuscript preparation due to time constraints and insufficient training, leading to missed opportunities for sharing valuable clinical insights (6,7).

Our study highlights the effectiveness of a novel, practical approach to medical writing training. By engaging participants as active contributors to a manuscript intended for publication, the course fosters a deeper commitment to the learning process, as noted also in other scientific sections (23). The hands-on experience contrasts with traditional methods that rely solely on the appraisal of existing literature, which may not adequately prepare participants for independent manuscript preparation (15,16,24).

A recent study by Astaneh et al. focused on a two-day workshop on medical writing, revealing that it had a positive impact on enhancing participants' confidence in various writing skills such as utilizing figures in the results section, summarizing the main findings, crafting the conclusion, and adhering to checklists (25). The high satisfaction scores and a 100% successful publication of manuscripts from all three course editions of the AIMS Academy underscore the efficacy of the approach. Minor revisions requested by peer reviewers indicate the initial quality of the manuscripts, affirming the rigor of the training process and resulting in a faster time to publication, which also improved during the 3 years.

A key feature of the AIMS course model is its emphasis on motivation, which was demonstrated by the questionnaire results. Participants were highly engaged, realizing that their efforts directly contributed to a tangible outcome, a published article. This sense of ownership enhanced their dedication to the course and encouraged proactive participation in discussions and revisions, as suggested in other educational scenarios.(26) Notably, none of the participants felt discredited during the reviewing

process, while they felt a benefit in having an expert in the group, which is consistent with the literature (27,28).

This study has several limitations. First, the small sample size ( $n=18$ ) and lack of a control group limit generalizability. However, literature served as a solid comparison. Second, the study lacks pre-course assessments, limiting direct measurement of improvement; future iterations will include pre-post evaluations. Reliance on self-reported measures introduce subjectivity and validated questionnaires for assessing satisfaction were not available; objective metrics will be added in future studies. While publication success suggests efficacy, confounding factors like journal selection may influence outcomes. Future iterations of this model could explore expanding eligibility criteria to include a broader range of participants and incorporating mentorship components to provide ongoing support beyond the workshop. Further research should also assess the long-term impact of such training on participants' subsequent publication rates and career trajectories.

## Conclusion

The medical writing courses of AIMS Academy Clinical Research Network offer a replicable model for empowering clinicians, residents, and medical students to contribute to the scientific literature. By transforming participants into authors, these courses provide an effective and motivational pathway for advancing medical writing proficiency, with broader implications for enhancing evidence-based practice and professional development in medicine. Future research should assess long-term impacts on publication rates and incorporate objective measures.

## Author's Contributions

Giulio Mari and Richard Sassun idealized, sent the surveys, performed the statistical analysis and drafted the manuscript. Jacopo Crippa and Pietro Achilli supervised the methodology and revised the drafted manuscript. Antonino Spinelli, Isacco Montroni, and Abe Fingerhut provided critical feedback, supervised the methodology and revised the drafted manuscript.

## Conflicts of Interest

The authors declare no conflicts of interest.

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