Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Enhancing History-Taking and Documentation Using a 5W1H Framework in Medical Students: a Prospective Cohort Study

Jeffrey Liao
China Medical University Hospital
Audry-Yun-Xuan Chan
China Medical University Hospital
Yu-Tung Teng
China Medical University Hospital
Che-Wei Liu
China Medical University Hospital
Chun-Fang Chuang
Taipei Medical University-Shuang Ho Hospital
Chang-Cheng Chang
changcc1975@gmail.com

China Medical University Hospital

Research Article

Keywords: 5W1H, medical education, history-taking, medical record writing, medical students

Posted Date: September 15th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10804430/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Introduction:

Well-organized medical records are essential for clinical communication and decision-making. For medical students, learning how to write a medical record is crucial for developing clinical reasoning and patient care abilities. However, junior students often find it difficult to filter and systematically organize patient information during history-taking. To overcome this, we created a structured educational course using the 5W1H framework (Who, What, When, Where, Why, How) to help medical students complete medical records more efficiently.

Methods

A prospective cohort study with a pre- and post-intervention design was conducted at China Medical University Hospital from January to December 2023. Fifth- year medical students completing their plastic surgery rotation attended two 1-hour 5W1H lessons. The questionnaire was developed based on Levels 1 (Reaction) and 2 (Learning) of the Kirkpatrick Evaluation Model. Pre- and post-course questionnaires assessed four domains: Willingness, Fluency, Conciseness, and Efficiency.

Results

103 students were enrolled and divided into experienced (Group A, n = 60) and novice (Group B, n = 43) cohorts based on prior clerkship experience. Both groups showed significant improvements after the intervention, with large effect sizes across all four domains. Conciseness demonstrated the most consistent improvement. Although Group A had higher baseline scores in Willingness, Fluency, and Efficiency, a one way analysis of covariance (ANCOVA) adjusting for baseline scores showed no significant between-group differences in Willingness, Fluency, or Conciseness after the intervention. Only Efficiency remained significantly higher in Group A, suggesting that documentation efficiency may require greater clinical experience.

Conclusion

Students at different stages of clinical training benefited from the 5W1H framework in different ways. For novices, it provided a clear structure for organizing patient information and writing medical records, while students with prior clerkship experience mainly improved their documentation efficiency. Given its simplicity and ease of implementation, the 5W1H framework may be a useful addition to early clinical training.

Trial registration:

The study was approved by the Department and Institutional Ethical Committees of the China Medical University, Taichung, Taiwan (Registration No.: CMUH112-REC-002.)

1. Introduction

1.1 The Importance of Medical Records in Clinical Education

Well-organized medical records provide clear information for clinical decision making between healthcare providers. Furthermore, well-completed medical records contribute to better healthcare outcomes [1]. In medical student training, clinical documentation plays an important role in strengthening clinical reasoning and participation in patient care. By learning to write high-quality clinical notes during their training, students are better prepared for their future roles as physicians [2]. Medical records also serve as a window into students' history-taking (i.e., medical interview) skills and their clinical reasoning proficiency.

Fürstenberg's research found that junior students systematically struggle to filter patient information during history-taking [3]. Students might feel discouraged and lose motivation when working with patients, as they dedicate a lot of time but see little results. As Kasaye's study showed, good medical documentation is linked not only to good training but also to motivation. To increase motivation, it is essential to provide regular training, offer clear guidelines, and encourage feedback and monitoring [4]. Therefore, offering relevant courses is essential for enhancing students' ability to conduct effective medical interviews [5, 6].

1.2 The 5W1H Framework

The structural approach to communication was originally introduced by Harold Dwight Lasswell, an American political scientist and communication theorist, in his publication "The Structure and Function of Communication in Society" [7]. However, the specific 5W1H framework (Who, When, Where, What, Why, and How) utilized for problem-solving traces its modern popularization to Rudyard Kipling’s "six honest serving-men" [8]. Often referred to as "The Kipling Method" in management literature, this cognitive scaffold has been widely adopted beyond journalism into business, manufacturing, and the services industry to ensure comprehensive data collection and root-cause analysis [9, 10]. The broad applicability of the 5W1H framework across various fields indicates it could serve as a versatile thinking tool. In clinical practice, the principle of structured, systematic questioning helps medical students gather relevant patient information in an organized and efficient way.

1.3 Current Challenges in Taiwan Medical Education

In Taiwan, medical students begin their clinical training in their fifth and sixth years of medical school. They frequently struggle with organizing information obtained from patients. Medical records often become lengthy narratives that lack concise details for differential diagnosis, making effective

communication among healthcare providers more difficult. To address this challenge, we designed a course based on the 5W1H framework and evaluated its impact on history-taking and medical record documentation among medical students.

2. Methods

2.1 Study Setting and Design

The 5W1H lesson was conducted at China Medical University Hospital (CMUH) in central Taiwan from January 2023 to December 2023. CMUH is a tertiary medical center that serves as a major medical training site for medical students from across Taiwan and Southeast Asia. The study used a prospective pre- and post-intervention design with matched questionnaires administered immediately before and after the 5W1H course.

2.2 The 5W1H Medical Framework

In medical records, the 5W1H framework is applied to guide systematic history-taking:

- **What** brought you here? → Chief complaint
- **Who** are you? → Basic patient data
- **When** did the symptom start? → Timeline and progression pattern
- **Where** is the lesion / did it happen? → Location and mechanism
- **Why** did you come to the OPD/ED instead of a local physician? → Severity
- **How** have you or others relieved the illness? How are you now? → Previous management and current status

These questions facilitate the systematic collection of medical history and improve doctor-patient communication, helping students gather the most relevant information for differential diagnosis in a clear and organized manner (Table 1).

Table 1
Clinical 5W1H Framework for Structured Bedside History Taking

Domain	High-Yield Question (Bedside Use)	Clinical Pearls
Who	• How old is the patient? Sex? Occupation? • Any chronic diseases or previous surgeries? • Current medications or allergies? • Smoking / alcohol / betel nuts / substance use / travel / exposure history	Establishes baseline risk profile and predisposition to disease.
When	• When did the symptoms begin? • Sudden or gradual onset? • Continuous or intermittent? • Improving, worsening, or fluctuating over time?	Onset and progression are critical for differentiating acute, subacute, and chronic conditions.
Where	• Where is the symptom located? • Does it radiate or spread elsewhere? • Localized, focal, or generalized involvement?	Anatomical localization is central to diagnostic reasoning.
What	• What is the nature of the symptom? (pain, weakness, dizziness, dyspnea, numbness, etc.) • Severity or functional impact? • Associated symptoms? • Pertinent positive and negative findings?	Symptom pattern recognition supports syndrome identification and differential diagnosis.
Why	• Any precipitating factors? • Relation to posture, meals, exertion, stress, or infection? • Recent trauma or environmental exposure?	Triggering factors often provide important etiologic clues.
How	• What aggravates or relieves the symptoms? • Any medications or prior treatments attempted?	Treatment response itself may provide diagnostic insight.

Domain	High-Yield Question (Bedside Use)	Clinical Pearls
	• Response to previous interventions or evaluations?	

2.3 Participants

Fifth-year medical students participating in the plastic surgery department rotation during their first-year clinical clerkship at CMUH were enrolled.

Inclusion Criteria:

- Fifth-year medical students undertaking an internship at CMUH
- Completion of both 5W1H lessons in medical history-taking and documentation
- Age 20 years or older

Exclusion Criteria:

- Traditional Chinese Medicine students lacking foundational basic medical science courses
- Students who did not attend or complete the 5W1H lessons
- Failure to accurately complete pre- and post-course questionnaires

2.4 Implementation of the 5W1H Lessons

All fifth-year medical students participating in the plastic surgery rotation attended two one-hour lessons. To promote active engagement, students sat in a circle while the medical record was displayed on a large screen for group viewing and discussion.

Lesson 1: Medical Record Discussion, Correction, and 5W1H Framework Introduction

The first lesson was held on the first Friday of the plastic surgery rotation. During the preceding weekdays (Monday through Thursday), each student was assigned a specific patient and instructed to conduct history-taking independently. They conducted history taking, gathered disease-related information, and used the material to write the "Present

Illness" section of the patient's medical record.

The first lesson comprised two sequential parts:

Part 1 – Medical Record Discussion and Correction

One student was chosen to present their record, which was then displayed on the screen for all classmates and the supervisor to see. This presentation provided a base for discussion, enabling peers to give feedback and insights. The supervisor then reviewed each piece of feedback, refining the record in real time with on-screen, color-coded text, while directly addressing omissions or inaccuracies.

This design thoughtfully includes the idea of "Productive Failure" [11], a proven learning method where students initially face a challenging problem and try to solve it on their own before they receive specific guidance and feedback. This approach helps students identify their gaps, connect more deeply with the material, and develop a stronger conceptual understanding than through direct instruction alone.

Part 2–5W1H Framework Introduction and Application

The instructor explained the 5W1H framework and its clinical application. Students then reviewed the same medical record from Part 1, answering the 5W1H questions to strengthen their understanding through hands-on practice. At the end of Lesson 1, students were assigned to apply the 5W1H framework to their designated patient in the following week.

Lesson 2: Review, Comparison, and Consolidation

In the second lesson, students presented their newly written medical records, created using the 5W1H framework, and compared them with their original records from the previous week. The group discussed improvements in structure, completeness, and conciseness. The supervisor offered specific feedback to reinforce the proper use of the framework.

2.5 Questionnaire Design

Data were collected via anonymous Google Forms questionnaires. A third-party team, consisting of sixth-year medical student research assistants not involved in supervising clinicians, conducted the statistical analysis to minimize potential grading bias affecting student responses. The full English version of the questionnaire is provided in Supplementary File 1.

The questionnaire (Supplementary File 1.) was developed based on the Kirkpatrick Evaluation Model to assess Level 1 (Reaction), reflected by students' willingness to approach patients, and Level 2 (Learning), reflected by their self-perceived fluency, conciseness, and efficiency in applying the 5W1H framework. Baseline information regarding previous history-taking training was collected before the intervention. Participants then rated their performance before and after the intervention across four domains—willingness, fluency, conciseness, and efficiency—using a 5-point Likert scale (1 = very low, 5 = very high) (Table 2).

An additional qualitative open-ended question was included: "What would you recommend for the 5W1H lesson to improve clinical learning effectiveness or work efficiency?"

Table 2
Pre- and post-5W1H questionnaire based on the four domains using the 5-point Likert scale.

Domain		Answer
	1	**Feels overwhelmed, avoids approaching the patient.**
The **willingness level** to approach a new patient	2	Approaches the patient reluctantly
	3	Approaches a new patient calmly and without hesitation
	4	Looks forward to approaching a new patient
	5	Proactively seeks out new patients to approach on their own initiative.
The **fluent level** while taking the history from a new patient	1	Requires a tutor's assistance to conduct history-taking
	2	Able to conduct history-taking independently. However, the conversation is lengthy and unfocused.
	3	Able to conduct history-taking independently. The conversation covers the key points, but remains lengthy.
	4	Covers the key points with only occasional hesitation
	5	Conducts history-taking fluently and efficiently, focused directly on relevant information.
The **concise level** of the medical record	1	Records patient information without logical structure or organization
	2	Begins applying the 5W1H framework but still omits some relevant information
	3	Applies the 5W1H framework and obtains appropriate information, but is unable to filter or prioritize it effectively
	4	Makes good use of the 5W1H framework to conduct efficient systematic history taking
	5	Makes full use of the 5W1H framework to conduct efficient, systematic history-taking and formulates a differential diagnosis based on gathered information
The **efficient level** of writing a medical record	1	Frequently works overtime to complete medical records.
	2	Occasionally works overtime to complete medical records
	3	Completes medical records within working hours, taking more than 1 hour
	4	Completes medical records within working hours, taking 0.5 to 1 hour

Domain		Answer
	1	**Feels overwhelmed, avoids approaching the patient.**
	5	Completes medical records within working hours, taking less than 0.5 hours

2.6 Data Analysis

Data were organized and tabulated in Microsoft Excel. Statistical analyses were conducted using GraphPad Prism version 10.0.0 (San Diego, CA, USA). Descriptive statistics summarized Likert-scale responses, reported as medians and interquartile ranges (IQR). Pre- and post-intervention differences in the four quantitative domains were assessed using the Wilcoxon matched-pairs signed-rank test. Statistical significance was defined as $p < 0.05$. Effect sizes were calculated as Rosenthal's r ($r = \frac{Z}{\sqrt{N}}$), which N represents the total number of observations included in the paired analysis (twice the sample size). Following Cohen's guidelines, r values of 0.1, 0.3, and 0.5 were interpreted as small, medium, and large effects, respectively.

Between-group differences were evaluated using Kruskal-Wallis tests with Dunn's multiple comparison. Comparisons between Group A and Group B at baseline and post-intervention were made with Mann-Whitney U tests. Thematic analysis of qualitative open-ended responses, following Braun and Clarke's reflexive approach, was used to code, categorize, and analyze the data. Two independent coders analyzed responses separately in the original Chinese, resolving discrepancies through discussion and consensus. A one-way analysis of covariance (ANCOVA) was performed to compare post-intervention scores between Group A and Group B while controlling for baseline (pre-intervention) scores as covariates. This analysis was conducted to determine whether differences between the two groups remained after adjusting for baseline performance.

2.7 Ethics

Ethical approval

for this study was obtained from the China Medical University Human Research Ethics Committee (approval number CMUH112-REC-002). All students were informed that participation was voluntary, that their identities would remain anonymous to the course supervisor, and that their responses would not affect their clinical rotation grades. The questionnaire was administered by third-party research assistants to eliminate any influence of power dynamics.

3. Results

3.1 Participant Characteristics

A total of 103 fifth-year (M5) medical students completing their clinical rotation in the Department of Plastic Surgery at China Medical University Hospital were enrolled in this study. Participants were evaluated and categorized based on two primary criteria: their prior exposure to formal case-based history-taking instruction and their completed clinical clerkship experiences at the time of enrolment.

To assess the impact of prior instruction, students were divided into two distinct cohorts: Group A (Experienced, n = 60), which comprised students who had previously received formal case-based history-taking training, and Group B (Novice, n = 43), which consisted of students with no prior formal training in this domain. The baseline characteristics and clinical backgrounds of the two cohorts are detailed in Table 3 (Supplementary Figure S5). Notably, the distribution of prior clinical clerkship experiences was significantly different and distinctly dichotomized between the two cohorts ($p < 0.001$). Strikingly, 100% of the students in Cohort B (Novice) were undertaking surgery as their very first clinical clerkship (Group 1). Conversely, all students (100%) in Cohort A (Experienced) had already completed at least one core clinical clerkship prior to this rotation. This clear baseline asymmetry perfectly reflects the natural academic progression within the medical curriculum, wherein students with prior clinical rotation exposure were the ones who had received formal history-taking instruction, making the division between experienced and novice cohorts exceptionally well-defined.

Table 3
Baseline characteristics of the medical students (N = 103).

Characteristic	Total (N = 103)	Group A: Experienced (n = 60)	Group B: Novice (n = 43)
M5 medical students	103 (100%)	60 (58.25%)	43 (41.75%)
Prior Clerkship Experience			
- Surgery first	43 (41.7%)	0 (0.0%)	43 (100%)
- Internal Medicine completed	23 (22.3%)	23 (38.3%)	0 (0.0%)
- OB/GYN and Pediatrics completed	22 (21.4%)	22 (36.7%)	0 (0.0%)
- IM, OB/GYN and Pediatrics completed	15 (14.6%)	15 (25.0%)	0 (0.0%)

3.2 Group A vs Group B Pre- vs. Post-Intervention Outcomes

Wilcoxon matched-pairs signed-rank tests were used to assess pre- and post-intervention changes within each cohort (Fig. 1). Group A (Experienced, n = 60) showed significant improvement in all four domains following the intervention: Willingness ($p < 0.0001$, $r > 0.36$), Fluency ($p < 0.0001$, $r > 0.36$), Conciseness ($p < 0.0001$, $r > 0.36$), and Efficiency ($p < 0.0001$, $r > 0.36$). Group B (Novice, n=43) also showed significant improvement in all four domains: Willingness ($p = 0.0002$, $r = 0.40$), Fluency (p =

0.0001, $r = 0.42$), Conciseness (p < 0.0001, $r > 0.42$), and Efficiency (p = 0.0192, $r = 0.25$). The findings demonstrated large effect sizes across all domains (Fig. 1).

Mann-Whitney U tests showed that, at baseline, Group A scored significantly higher than Group B in Willingness (p = 0.0430), Fluency (p = 0.0252), and Efficiency (p = 0.0013), whereas no significant difference was observed in Conciseness (p = 0.407) (Fig. 2). Following the intervention, the between-group differences in Fluency (p = 0.0862) and Conciseness (p = 0.134) were no longer significant. Willingness remained slightly higher in Group A (p = 0.0336), while Efficiency also remained significantly higher (p < 0.0001) (Fig. 2).

As baseline differences were present, an ANCOVA was performed with pre-intervention scores entered as covariates. After adjustment, no significant differences were found between the two groups in Willingness ($F(1, 100) = 1.94$, p = 0.166), Fluency ($F(1, 100) = 0.274$, p = 0.602), or Conciseness ($F(1, 100) = 1.65$, p = 0.202). Only Efficiency remained significantly different ($F(1, 100) = 5.26$, p = 0.024), suggesting that although the intervention appeared to reduce the initial differences in most domains, developing documentation efficiency may require more sustained clinical experience.

3.3 Qualitative Findings

Of 103 enrolled students, 48 (46.6%) responded to the open-ended question. Their responses revealed several common themes. Students primarily reported that the 5W1H framework helped reduce omissions and improved the logical flow of their records. They also reported greater precision in clinical observations and documentation, particularly in describing physical exam findings, wound characteristics, and specialty-specific clinical details.

Students' feedback was consistent with the Level 1 (Reaction) and Level 2 (Learning) outcomes of the Kirkpatrick framework. Many perceived the lesson as highly practical and relevant to their clinical clerkship and reported greater confidence, improved efficiency, and increased awareness of gaps in their documentation. Several noted that it helped transfer documentation skills across various clinical specialties, enabling them to identify specific differences while keeping systematic clinical reasoning. Responses also showed increased reflective practice, with students becoming more conscious of omissions, inefficiencies, and lapses in focus in their previous habits. Furthermore, some students considered medical record writing a crucial professional skill and emphasized the need for early structured documentation training in clinical education. Additionally, students suggested curriculum improvements including standardizing documentation instructions across specialties, expanding case-based practice, integrating with existing documentation systems, and adding detailed, open-ended evaluation questions to gather more in-depth insights beyond simple quantitative ratings.

4. Discussion

4.1 The Equalizing Effect of the 5W1H Framework

The 5W1H framework offers a structured and efficient method for clinical history-taking, addressing a well-documented educational gap [3, 5]. A central finding of this study is its positive, equalizing impact on both experienced (Group A) and novice (Group B) students. Initially, both groups struggled with conciseness. Acting as a universal cognitive scaffold [9], the 5W1H framework helped students logically structure patient encounters, effectively bridging the baseline gap in *Fluency* and *Conciseness*. Beyond documentation quality, students reported greater clinical confidence [5, 6]. Interestingly, while the intervention equalized Fluency and Conciseness, *Efficiency* remained significantly higher in Group A post-intervention. This suggests that while structural tools rapidly improve writing clarity, true clinical efficiency is a time-dependent skill relying on pattern recognition and prior clinical exposure [3].

4.2 Pedagogical Approach: Productive Failure

A distinctive feature of the lesson is its incorporation of the "Productive Failure" concept [11, 12]. Instead of providing the correct framework initially, the course intentionally requires students to draft records using their own strategies before receiving targeted, supervisor-guided correction. This unguided phase was crucial: for novices (Group B), it highlighted knowledge gaps and motivated them to internalize the 5W1H structure rather than passively absorbing it. For experienced clerks (Group A), it prompted critical reflection, helping them unlearn verbose habits acquired in prior rotations. Qualitative findings robustly support this, with students explicitly reporting increased reflective practice and awareness of previous omissions.

4.3 Collaborative and Interactive Learning

The circular seating and live-screen projection fostered a highly interactive and collaborative learning environment. Prompting students to provide peer feedback prior to expert supervisor input shifted the pedagogical focus toward active engagement, effectively reinforcing the structural lessons of the 5W1H framework through peer-to-peer learning.

4.4 Comparison with Existing Frameworks

While experienced students may know detailed, organ-specific mnemonics like OCCHLTH, SOCRATES, these complex tools can easily overwhelm early-stage learners [13, 14]. In contrast, the 5W1H approach provides a broader, more intuitive structure. Qualitative feedback highlighted its cross-specialty transferability as a universal baseline for clinical reasoning. It is especially beneficial for novices (Group B), providing a simple, recall-friendly framework that minimizes cognitive overload across diverse medical and surgical contexts.

4.5 Limitations and Future Directions

Several limitations should be acknowledged. First, this study was conducted at a single center within a plastic surgery department, which may limit the generalizability of the findings to other clinical settings. Second, the outcomes were based on self-reported questionnaires, and therefore may be influenced by response bias. In addition, the lack of long-term follow-up prevented us from determining whether the improvement in documentation skills was maintained over time. The absence of a control group also

makes it difficult to fully separate the effects of the intervention from the natural development of clinical skills during clerkship. Nevertheless, improvements were observed consistently across all domains, with the greatest change seen in conciseness, suggesting that the 5W1H-based intervention may have contributed to better documentation practices.

This study focused mainly on Level 1 (Reaction) and Level 2 (Learning) outcomes of the Kirkpatrick Model. Future studies involving multiple institutions should further evaluate whether these improvements translate into actual clinical practice through Level 3 (Behavior) assessments. For example, objective evaluation of medical records by blinded attending physicians could help determine whether students are able to apply these skills consistently. In addition, examining Level 4 (Results) outcomes, such as changes in documentation time or efficiency within electronic health record systems, may provide further insight into the practical value of the intervention.

5. Conclusion

This study suggests that the 5W1H-based intervention may improve history-taking and medical record-writing skills among medical students. Improvements were observed across nearly all evaluated domains, with conciseness showing the most consistent gains across all subgroups.

Notably, the intervention benefited students differently depending on their prior clinical exposure. For novices without prior clerkships (Group B), the 5W1H framework may have provided a useful structure, reducing the gap between novice and experienced students specifically in fluency and conciseness. Conversely, students with prior clinical experience (Group A) maintained higher overall scores in efficiency. For these experienced students, the framework may have served as a tool to organize complex patient histories more rapidly rather than just a basic writing guide.

Overall, the 5W1H framework is a practical and easily teachable method that can be applied from a student's first patient encounter. A brief, two-hour training was sufficient to produce these improvements. Incorporating this structured framework into early clinical curricula can help novices build a solid documentation foundation while allowing experienced students to further refine their clinical efficiency.

Abbreviations

• **CMUH**
China Medical University Hospital
• **ED**
Emergency Department
• **LQQOPERA**
Location, Quality, Quantity, Onset, Precipitating, Exacerbating/Relieving, Radiation, Associated symptoms
• **OPD**

Outpatient Department
• **OB/GYN**
Obstetrics and Gynecology
• **5W1H**
Who, What, When, Where, Why, How
• **OCCHLTH**
Onset, Musculoskeletal, Conditions, Handling, Lifting, Time & Travel, Hazards and Harsh Conditions
• **SOCRATES**
Site, Onset, Character, Red flags, Associated symptoms, Timing, Exacerbating/relieving factors, Severity

Declarations

Ethics approval and consent to participate:

The study was approved by the Department and Institutional Ethical Committees of the China Medical University, Taichung, Taiwan (Registration No.: CMUH112-REC-002). As this study involved an anonymous educational questionnaire, the requirement for written informed consent was waived by the IRB, and implied informed consent was obtained from all participants prior to their participation. All methods were carried out in accordance with relevant guidelines and regulations, including the Declaration of Helsinki.

Consent for publication: Not applicable

Availability of data and materials:

All data generated or analysed during this study are included in this published article and its supplementary information files.

Competing interests:

The authors declare that they have no competing interests.

Funding:

No funding was received for this study.

Notes on contributors:

Jeffrey Liao is a medical student at the School of Medicine, China Medical University, Taichung, Taiwan.

Audry-Yun-Xuan Chan is a medical student at the School of Medicine, China Medical University, Taichung, Taiwan.

Yu-Tung Teng is a resident at the School of Medicine, China Medical University, Taichung, Taiwan.

Che-Wei Liu is a resident in the Division of Plastic and Reconstructive Surgery, Department of Surgery, China Medical University Hospital, Taichung, Taiwan.

Chun-Fang Chuang is a resident at the Department of Neurology, Taipei Medical University, Shuang Ho Hospital, New Taipei, Taiwan.

Chang-Cheng Chang, MD, PhD, FACS, is a Professor at the School of Medicine, China Medical University, and an attending surgeon at the Aesthetic Medical Center, China Medical University Hospital, Taichung, Taiwan.

Author Contributions:

Conceptualization: C-C Chang.

Data curation: J Liao, A-Y Chan, Y-T Teng, C-W Liu, C-F Chuang.

Formal analysis: J Liao, A-Y Chan, Y-T Teng, C-F Chuang.

Investigation: Y-T Teng, C-F Chuang, C-C Chang.

Methodology: Y-T Teng, C-C Chang.

Software: J Liao, A-Y Chan.

Supervision: C-C Chang.

Validation: J Liao, A-Y Chan, C-C Chang.

Visualization: J Liao, A-Y Chan.

Writing – original draft: Y-T Teng, C-F Chuang.

Writing – review & editing: J Liao, A-Y Chan.

All authors read and approved the final manuscript.

Acknowledgements:

The authors have no acknowledgements to declare.

References

1. Siegler EL, Adelman R. Copy and paste: a remediable hazard of electronic health records. Am J Med. 2009;122(6):495–496.

2. Haller G, Myles PS, Taffe P, et al. Rate of undesirable events at the beginning of the academic year: retrospective cohort study. BMJ. 2009;339:b3974.
3. Fürstenberg S, Schaper E, Behringer J, et al. Students' history-taking skills in relation to their clinical experience and to a curricular reform. GMS J Med Educ. 2017;34(5):Doc60.
4. Kasaye MD, Beshir MA, Endehabtu BF, Tilahun B, Guadie HA, Awol SM, Kalayou MH, Yilma TM. Medical documentation practice and assocted factors among health workers at private hospitals in the Amhara region, Ethiopia 2021. BMC Health Serv Res. 2022;22:465.
5. Keifenheim KE, Teufel M, Ip J, et al. Teaching history taking to medical students: a systematic review. BMC Med Educ. 2015;15:159.
6. Bachmann C, Barzel A, Roschlaub S, Ehrhardt M, Scherer M. Can a brief two-hour interdisciplinary communication skills training be successful in undergraduate medical education? Patient Educ Couns. 2013;93(2):298–305.
7. Lasswell HD. The Structure and Function of Communication in Society. In: Bryson L, ed. The Communication of Ideas. Harper; 1948:37–51.
8. Dul J, Hak T. Case Study Methodology in Business Research. Butterworth-Heinemann; 2008.
9. Minto B. The Pyramid Principle: Logic in Writing and Thinking. Financial Times/Prentice Hall; 1987.
10. Imai M. Kaizen: The Key to Japan's Competitive Success. Random House; 1986.
11. Kapur M. Productive failure. Cognition and Instruction. 2008;26(3):379–424.
12. Kapur M. Productive failure in learning the concept of variance. Instructional Science. 2012;40(4):651–672.
13. Pandalai S. P. (2024). The OCCHLTH Mnemonic-Construction and Content of a Tool for Increasing Awareness of Occupational Illness and Injury. Journal of occupational and environmental medicine, 66(5), 403–420.
14. Katta-Charles, S., & Young, C. (2025). Clinical History and Examination of Headaches. Physical medicine and rehabilitation clinics of North America, 36(4), 663–676.

Figures

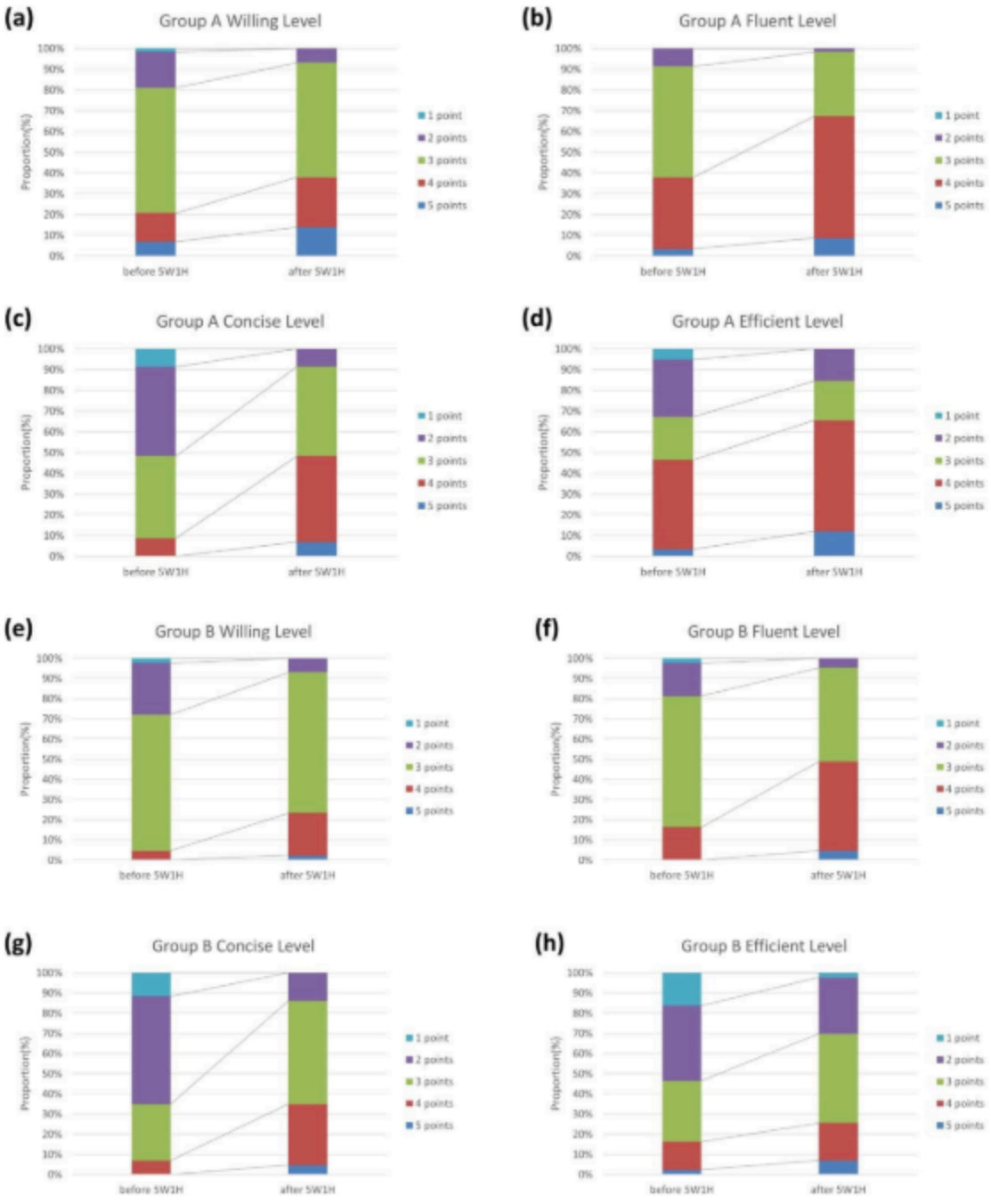


Figure 1

Score distribution comparisons before and after the 5W1H intervention in Group A and Group B (novice students undertaking surgery as their first rotation). The four evaluated domains are: (a)(e) Willingness, (b)(f) Fluency, (c)(g) Conciseness, and (d)(h) Efficiency. For each domain, stacked bar charts show the percentage of students at each Likert score (1–5 points), where a rightward shift in the distribution indicates overall improvement.

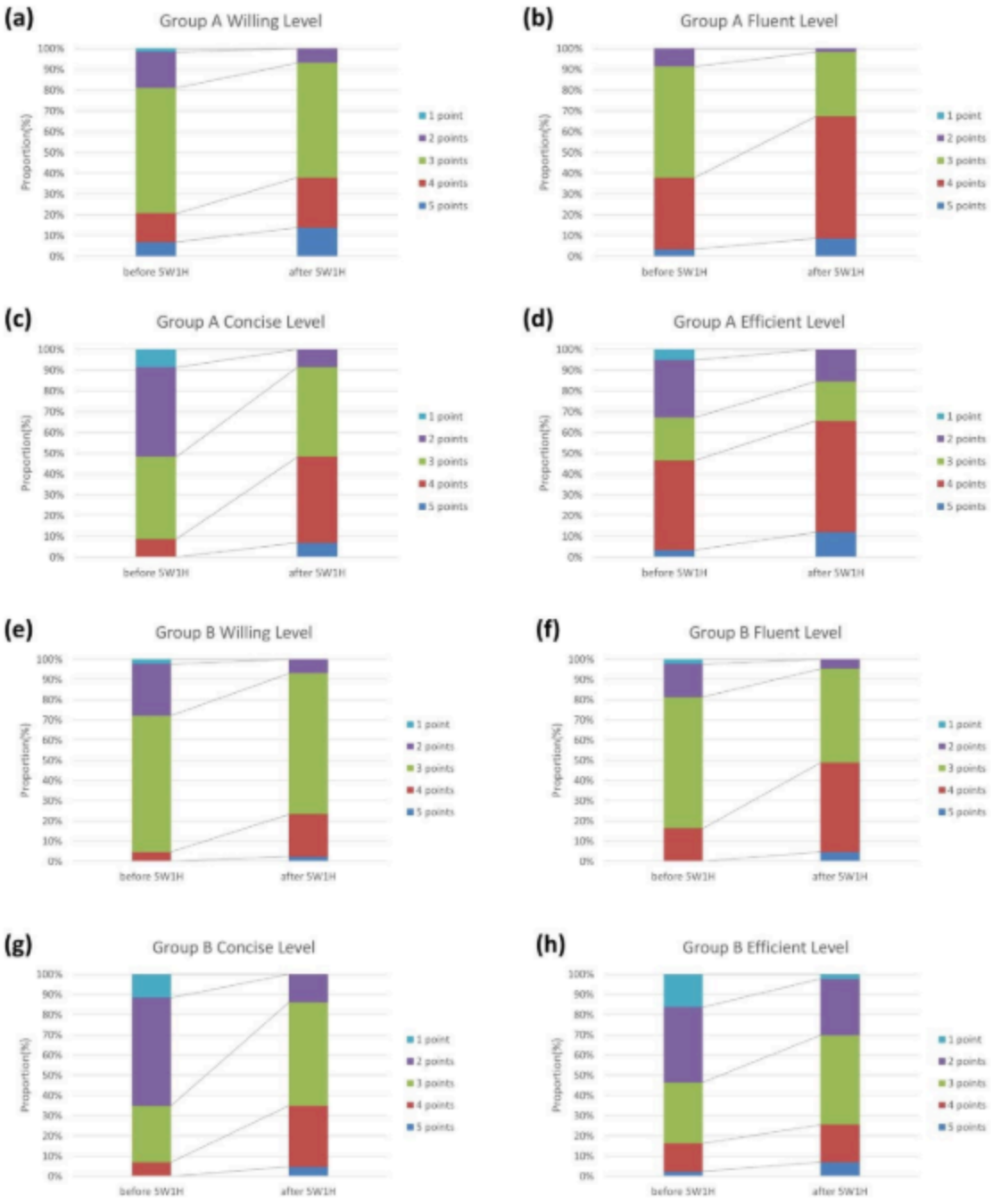


Figure 1

Score distribution comparisons before and after the 5W1H intervention in Group A and Group B (novice students undertaking surgery as their first rotation). The four evaluated domains are: (a)(e) Willingness, (b)(f) Fluency, (c)(g) Conciseness, and (d)(h) Efficiency. For each domain, stacked bar charts show the percentage of students at each Likert score (1–5 points), where a rightward shift in the distribution indicates overall improvement.

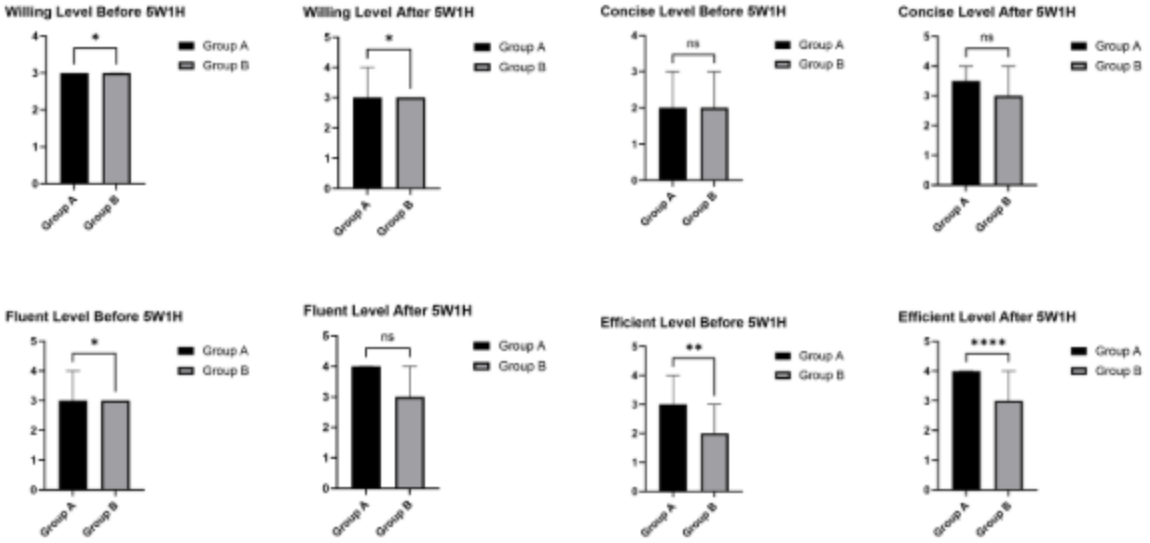


Figure 2

Comparison of Willingness, Conciseness, Fluency, and Efficiency Scores Between Group A and Group B Before and After the 5W1H Intervention. Data presented as median (IQR).

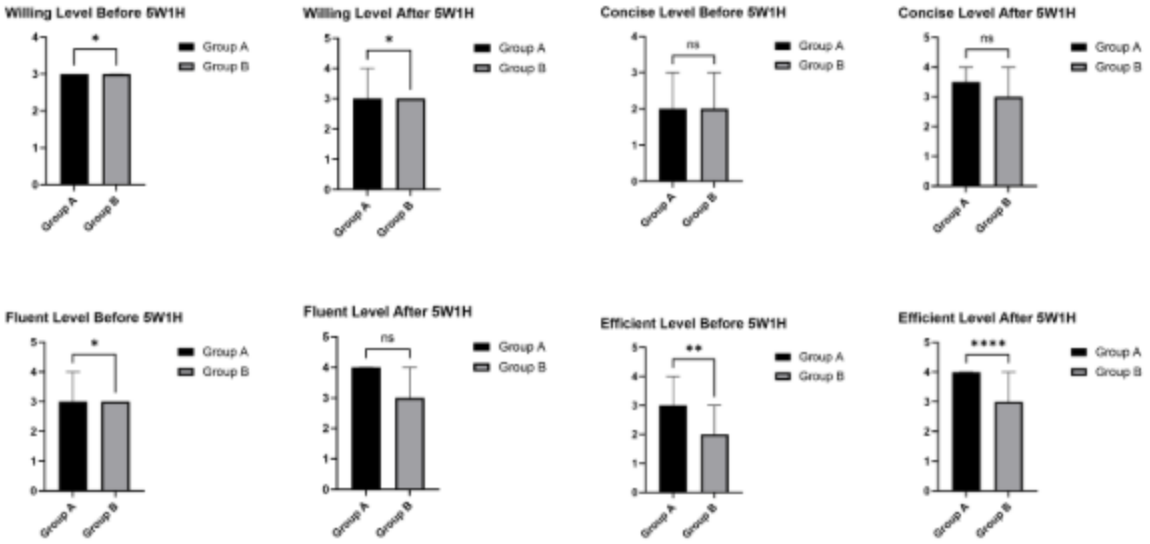


Figure 2

Comparison of Willingness, Conciseness, Fluency, and Efficiency Scores Between Group A and Group B Before and After the 5W1H Intervention. Data presented as median (IQR).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- 5W1Heducationsupplementarymaterials.docx
- 5W1Heducationsupplementarymaterials.docx

- SupplementaryFile1.docx
- SupplementaryFile1.docx