

CONTINUING MEDICAL EDUCATION FOR MEDICAL STAFF IN TERTIARY PUBLIC HOSPITALS RISK EDUCATION TO IMPROVE MEDICAL SERVICE RESEARCH ON INFLUENCING FACTORS

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ABSTRACT

This article aims to study continuing medical education in a hospital affiliated to a medical university in China and reveal the positive effects of continuing medical education (CME) activities on risk education and the driving factors behind them. Through in-depth research on CME activities, we explore the impact of risk education for medical staff on improving medical services and provide theoretical support for further optimizing CME methods. CME refers to the process by which in-service medical staff acquire new medical knowledge and skills through various channels, including courses, seminars, academic conferences, etc. By investigating the actual gains of medical staff in CME, we can measure their commitment to CME. This study adopts a mixed research between quantitative research and qualitative research, with 600 medical staff from the First, Second, Third, Fourth and Sixth Affiliated Hospitals of Harbin Medical University who participated in CME as the main survey subjects (including Doctors, nurses, technicians and pharmacists), using questionnaires and interviews to collect samples and data, through four data analysis methods of descriptive statistical analysis, reliability analysis, validity analysis and structural equation modeling. The results show that CME has a positive and significant impact on risk education in improving medical services. This study recommends improving the hospital CME management system, establishing an incentive mechanism and assessment system, and linking CME and risk education to improve hospital medical services.

Keywords: Continuing Medical Education, Risk Education, Medical Services.

INTRODUCTION

Background

Practical background

Continuing Medical Education (CME) is a type of lifelong education that focuses on learning new theories, knowledge, techniques, and methods after graduating from a medical education program.

CME started in the 1950s in China from the continuing education of medical personnel after the founding of the People's Republic of China, and the concept of CME was introduced in the late 1970s and early 1980s. 1991 saw the promulgation of China's first regulatory document on continuing medical

education, and 1995 saw the promulgation of the "Provisional Provisions on CME for National Professional and Technical Personnel" by the Ministry of Personnel (MOP), and June 1996 saw the "Establishment of the Committee on Continuing Medical Education of the Ministry of Health (MOH)". In June 1996, the Committee for Continuing Medical Education of the Ministry of Health was established, and in 2000, the Ministry of Health promulgated the Regulations on Continuing Medical Education (for Trial Implementation).

The level and quality of diagnosis and treatment by Chinese medical personnel cannot yet meet the needs of social modernization and people's health protection [1]. With the further reform of medical education and medical services, new and higher requirements are put forward for the quality of medical personnel. Continuing medical education is an important part of medical education, as well as the main way and important means of human resources development. How to correctly position the management of continuing medical education, i.e., the position of continuing medical education management in the development and construction of hospitals, is related to the overall development of the hospital industry in the future.

After nearly 30 years of exploration and practice, medical lifelong education in China has been widely established, with the formation of national and local medical lifelong education committees, which have perfected the approval of programs, the awarding of credits, project management, base construction, evaluation, and archive management. Continuing medical education in China has a perfect organization, rules and regulations, and takes various forms, covering all fields of medicine. Continuing medical education activities have been carried out nationwide at many levels and in many forms and have played an irreplaceable role in the progress of medical science, the continuous improvement of the technical level and service capacity of health professionals, and the scientific development of health undertakings.

In the development of continuing medical education, China still lacks an effective and perfect management system, which seriously restricts the development of continuing medical education. Although the system of continuing medical education in China's domestic hospitals has been established and gradually improved, there is still a huge gap between it and the needs of the reform and development of the health sector as well as people's ever-increasing demand for health services. This is mainly manifested in the following aspects: unbalanced development, insufficient resources and inefficient use of resources, insufficient supervision and management, and quality to be improved. In order to promote the development of continuing medical education, it is necessary to provide reasonable institutional guarantees, and the State should provide nationwide institutional public goods.

Through the flexible use of various modes of continuing education by medical and technical personnel at different levels, in different regions and specialties, to improve their learning ability and professional level, to promote the department to strengthen the quality management of continuing medical education activities, to enhance the importance of continuing education in various fields of the whole society, and to raise the awareness and attention of leaders at all levels and the general public of health and technical personnel to continuing medical education, to further promote the development of continuing medical education and promote the overall development and progress of medical treatment, teaching and scientific research in hospitals.

Theoretical background

Continuing medical education (CME) refers to educational activities for physicians that are designed to maintain, develop, or enhance the knowledge, skills, and professional performance and relationships used by physicians in the delivery of services to patients, the public, or industry. The goal

of CME is to improve healthcare outcomes and patient care by increasing professional (and increasingly inter professional) competence and performance. The endpoints of the survey are physicians and other health care professionals, processes, and outcomes [2].

As the total body of medical knowledge grows exponentially, there are many areas (e.g., scientific knowledge, technological advances, innovations in clinical practice, and new delivery models) that are critical for physicians, nurses, pharmacists, and technologists, regardless of their professional or academic affiliation. Therefore, medical staff participation in CME is a form of continuing professional development CME is important for medical staff because it helps medical staff maintain up-to-date medical knowledge and skills, improves the quality of care, protects patient safety, and enhances the competitiveness of medical staff's careers [3].

Problem statement

First of all, we need to clarify the importance of CME in the medical industry. CME is rapidly evolving into competency-based continuing professional development to include rapid changes in medical knowledge and healthcare practitioners, as well as changes in patients and society, healthcare systems, regulatory agencies, and the political environment [4]. According to the 2022 data report released by the Accreditation Council for Continuing Medical Education (ACCME), the number of educational activities accredited by ACCME increased by 13%, from approximately 204,000 in 2021 to 230,000 in 2022, representing the work of 1,620 accredited institutions [5]. However, despite the rapid development and growth of CME, our research on HCWs' CME approaches, i.e., the types of CME activities they engage in (including HCWs' demographic characteristics and professional attributes), and their risk education (medical errors, risk awareness) is still limited less.

Secondly, this study will deeply explore the positive effects of CME methods on risk education and the driving factors behind them. In previous studies, most of them have neglected to explore the relationship and impact of medical staff's risk education on participating in CME and the medical services of their hospitals. Therefore, this study will explore the impact of CME activities on risk education of medical staff and the driving factors behind these impacts through an in-depth study of CME activities.

This study will deeply explore the influencing factors of CME methods on risk education to improve medical services from multiple perspectives. This study is located in a university-affiliated hospital in Northeast China.

OBJECTIVES

Research Objectives

Reveal the positive effects of CME activities on risk education in improving medical services and the driving factors behind them. Through in-depth research on CME activities, we explore its impact on risk education of medical staff and the driving factors behind these impacts, providing theoretical support for further optimizing CME methods.

Research Significance

This study will conduct an in-depth exploration of the impact of CME activities on risk education to improve medical services and reveal the driving factors behind it. This will help improve and optimize the design and implementation of CME methods and improve its attractiveness and practical effect to medical personnel.

By analyzing the impact of risk education on hospital medical services and the driving factors behind it, this study will enrich the theoretical system in the field of medical service quality. The research

results will help guide hospital managers to pay attention to these factors, thereby improving the quality of medical services.

This study will attempt to find theoretical models and scales that can comprehensively and systematically explain the relationship between hospital medical services and drivers of CME activities. This will provide a theoretical framework and evaluation tool for future related research and promote the continued development of this field.

This study will explore how CME activities can improve the level of hospital medical services by influencing risk education. The research results will help hospital managers better formulate relevant policies and improve CME activities, thereby improving the quality of medical services.

This study focuses on the continuing education needs of medical staff, which will help improve the professionalism of medical staff and improve the level of medical services, which has important practical significance for the development of China's medical industry.

Innovation points and innovativeness:

1. This study will evaluate the positive effect of CME on risk education and the driving factors behind it, making up for the shortcomings of previous studies in this area, especially the lack of evaluation of the effects of CME. This will help improve and optimize the design and implementation of CME activities and improve their attractiveness and practical effects to medical personnel.

2. Reveal the specific role and interaction mechanism of CME and medical services in innovation management, which will help innovate educational methods, improve education quality, and provide medical staff with a more convenient and efficient way to continue education.

3. This study will draw on advanced international continuing medical education concepts and practices, combined with China's actual situation, and try to explore a path of CME suitable for the development of our country. This will help promote the development of CME in my country and improve the quality of medical services.

This research has important theoretical and practical significance and is innovative to a certain extent. It is hoped that the research results can provide useful references for the development of related fields. This study attempts to provide suggestions for Chinese hospitals on how CME methods can improve doctors' risk education and thus improve medical services. This study provides a valuable reference for other people paying attention to Chinese hospitals and doctors and provides quantitative data on CME of hospitals and doctors. The results of this study only represent doctors from tertiary-A public hospitals in China.

Research Gaps

Despite the best efforts to be thorough in the design of this study, there are still some possible limitations that may have some impact on the findings. Specifically: firstly, the sample selection for the study was limited in scope. Secondly, data collection and processing may be limited by time, resources and cost. Third, the accuracy and reliability of the data may be problematic. Fourth, due to the limitations of the research methodology, this study may not be able to fully reveal the complexity and relevance behind all the data.

Although this study attempted to design a sound research program, there are still some possible limitations of this study due to various reasons. It is hoped that these limitations can be overcome in future studies to further improve the quality and effectiveness of the study.

Text

This study aims to explore the impact of CME on risk education, taking the First, Second, Third, Fourth and Sixth Affiliated Hospitals of Harbin Medical University as the research objects. By investigating employees' gains in CME, it analyzes the impact of CME on employee risks. The impact of education (medical errors, risk awareness), and then explore the drivers of employee risk education. Through this study, we aim to innovatively sort out, summarize, and summarize the impact of continuing medical education on medical services in these five hospitals, and provide theoretical basis and practical guidance for improving medical services.

Research Questions

1. What are the factors influencing the CME approach to risk education?
2. What are the factors influencing risk education on medical services?
3. What are the factors that influence CME on medical services?

Research Scope

Scope of research objects

This study takes the medical staff of the First, Second, Third, Fourth, and Sixth Affiliated Hospitals of Harbin Medical University as the main research subjects, including doctors, nurses, and medical technicians. By investigating and analyzing the risk education (medical errors, risk awareness) of medical staff in these hospitals after CME was implemented, the influencing factors of CME on risk education to improve medical services were explored.

Scope of research fields

This research involves multiple subject areas, including medical management, organizational behavior, human resources management, etc. Through interdisciplinary research methods, the positive role of CME in improving medical services through risk education (medical errors, risk awareness) is analyzed from multiple perspectives.

Scope of research

According to the theoretical framework, the main contents of this study are as follows:

Table 1 Scope of research

Latent variable		Measured index
IV: CME Activities		Professional conferences
		In-house training
		Reading printed educational materials
		Online professional courses
		Professionally based face-to-face courses
Me: Risk Education	Medical Error	Medical knowledge and technology Use of medical equipment Quality of medical services
	Risk Awareness	Identifying medical risks Assessing medical risks Controlling medical risks
DV: Medical Service		KT
		PS
		QI

Research time frame

This study uses the past year (October 2022-September 2023) as the research time range to collect and analyze the relevant data of the First, Second, Third, Fourth, and Sixth Affiliated Hospitals of Harbin Medical University after the implementation of CME data.

Research hypothesis

This study has three hypotheses:

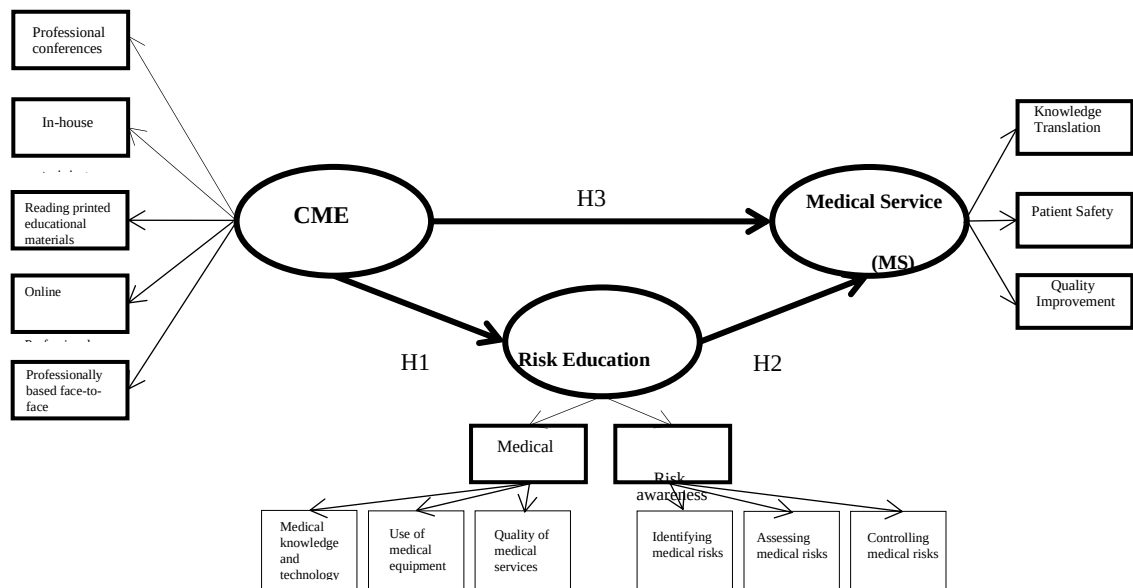
Hypothesis 1: The impact of CME on risk education of medical staff is positive and significant.

Hypothesis 2: Medical staff risk education has a positive and significant impact on medical services.

Hypothesis 3: CME has a positive impact on medical services.

Conceptual model

Figure 1 Conceptual model



METHODOLOGY

Research Paradigm

Part 1: Survey of CME (seven-level rating scale)

Part 2: Survey of risk education (seven-level rating scale)

Part 3: Survey of medical services (seven-level rating scale)

Part 4: Basic information collection

Research design

In terms of research type, this article selects relevant research to describe the relationship between CME and risk education to improve medical services and determines the mediating variables of risk education. In terms of research setting, this study was conducted in an environment that was well suited to the research objectives, namely, five hospitals affiliated with Harbin Medical University.

Research methods

This study is a hybrid between quantitative and qualitative research. The specific description is as follows: In terms of quantitative research, this study collected data on CME, risk education and medical services through questionnaires. In order to utilize the collected data for structural equation modeling (SEM) analysis and statistical data analysis, this study was implemented using statistical software.

In terms of qualitative research, the researcher used in-depth interviews to collect data from 20 people. Through a purposeful sampling survey, the researcher entered five hospitals for in-depth interviews, used the population and sample results of the field visits to analyze the research model of this article, and verified the relationship between CME and medical services.

Sampling method

Due to the large number of medical staff in the five hospitals, this article uses simple random sampling to collect data, with a sample size of 600, covering doctors, nurses, pharmacists and technicians. The sample subjects of this article are medical staff who have served in five hospitals for three years.

Description of data collection instruments used

The instrument used in this study was the questionnaire used to collect data. To create the instrument for this study, the researcher studied various concepts and theories and reviewed relevant literature.

The tool used in this study includes the following four parts:

This is a question of estimating the level of statistical opinion (rating scale) on a 7-point scale based on the Likert concept, from the highest to the lowest level of agreement, where the respondent has the most opinion.

Part 1: Questions asking for opinions on CME, questions estimating the level of statistical opinions on a 7-level Likert scale, 5 dimensions, 25 items.

Part 2: Questions asking for opinions on risk education, questions estimating the level of statistical opinions based on a 7-level Likert scale, with 6 dimensions and 12 items.

Part 3: Questions asking about opinions on medical services. Questions to estimate the level of statistical opinions based on a 7-level Likert scale. It has 3 dimensions and 15 items.

Part 4: The questionnaire is about the basic information statistics of medical workers in the five hospitals. The statistical analysis uses the percentage method.

Data collection procedures

In order to ensure that the questionnaire designed in this article has good reliability and validity, so as to better achieve the research purpose of this article, the data collection in this article was designed in strict accordance with six steps.

Pretest questionnaire

Compared with respondents randomly selected from the relevant population, a small number of respondents with certain characteristics is considered to be more effective in exploring errors in survey instruments. This article selected 50 medical staff as pre-investigators.

Data analysis

The data analysis tools used in this study consisted mainly of Wenjuanxing and the basic analytical functions of SPSS 26.0 software. The analysis included demographic characteristics of the respondents, reliability and validity analysis, descriptive statistics, and correlation analysis.

RESULTS

This study analyzes the impact of CME on risk education to enhance medical services based on questionnaire data from 600 medical staff of the First, Second, Third, Fourth, and Sixth Affiliated Hospitals of Harbin Medical University, with a data set covering basic information such as gender, age, and professional attributes.

Of the 600 valid questionnaires, male medical staff accounted for about 46.5% (279) and female medical staff accounted for about 53.5% (321), showing that there were slightly more women than men in the survey sample. This gender ratio reflects the current situation of gender distribution among medical staff in tertiary public hospitals and provides basic data for the subsequent analysis of differences in gender factors on CME participation and effects.

The age distribution showed that the percentage of young medical staff aged 22-25 years was 16.16%, indicating that young medical staff accounted for a certain percentage of the sample. Further breakdown of age will help to understand the needs and feedback of medical staff of different age groups on CME, which is important for the development of more targeted CME strategies.

This study found data on the participation of medical staff in CME activities, including professional conference, in-house training, reading printed educational materials, online professional courses, and professional-based face-to-face courses, which amounted to 85.5% (513), 99.5% (597), 94.5% (567), 85.33% (512), and 77.83% (467).

The above data show that CME activities have a high popularity among the medical staff of tertiary public hospitals, and most of them learn and self-improve through different forms of CME activities.

Table 1

Basic information on medical personnel (n=600)

Basic Information	Quantity	Percentage (%)
1. Gender		
Male	279	46.5
Female	321	53.5
2. Age		
22-25 years old	97	16.16
26-35 years old	181	30.17
36-45 years old	156	26
46-55 years old	139	23.17
Over 56 years old	27	4.5
3. Professional attributes		
Physician	246	41
Nurse	297	49.5
Pharmacist	13	2.17
Technician	44	7.33
4. What continuing medical education activities have you participated in over the past year?		
Professional conference	513	85.5
In-house training	597	99.5
Reading printed educational materials	567	94.5

Online professional courses	512	85.33
Professional-based face-to-face courses	467	77.83

Descriptive statistics summarize key quantitative indicators of CME variables derived from the 600 medical staff questionnaires, which include means, standard deviations, and variances that provide insights into concentration trends, variability, and dispersion of CME activities, risk education, and medical services.

The meaning of the descriptive statistics indicates the average response or agreement of the respondents to CME, risk education and medical services. The "Mean $\pm$ Standard Deviation" of 4.798 ± 1.747 , 4.807 ± 1.754 , and 4.818 ± 1.755 for CME, risk education, and medical services in this study indicates that the mean scores of the evaluators on this scale are close to the upper-middle of the range, which indicates that the overall evaluation is positive; The standard deviation indicates the degree of dispersion of the evaluation results, and these three standard deviations are relatively large, indicating that the respondents' ratings on this scale varied widely and their opinions were not uniform; the mean values of the variances of CME, risk education, and medical services were 3.052, 3.077, and 3.081, and the higher variance implies a wider range of responses and a more diverse range of opinions or attitudes toward CME, risk education, and medical services.

Table 2

Reliability test results (n=600)

latent variable	Measurement items	Total corrections correlation (CITC)	The term deleted α coefficient	Cronbach α coefficient
CME	X11-X15	0.689	0.959	0.961
Risk Education	M21-M23	0.657	0.840	0.863
	M24-M26	0.632	0.824	0.849
Medical Service	Y11-Y13	0.673	0.930	0.934

The reliability coefficients of the 600 questionnaires are 0.961, 0.863, 0.849 and 0.934, which are greater than 0.8, indicating that the data reliability quality of this study is high. For the "alpha coefficient of item deleted", the reliability coefficient does not increase significantly when any question item is deleted, so it indicates that the question item should not be deleted. Regarding the "CITC value", the CITC values of the analyzed items are all greater than 0.4, which indicates that there is a good correlation between the analyzed items, and also indicates that the reliability level is good.

Table 3

Validity test results (n=600)

CME	KMO		0.985
	Bartlett Sphericity Check	Approximate chi-square (math.)	8539.844
		df	300

	<i>p</i> -value	0
Risk Education	KMO	0.966
	Bartlett Sphericity	Approximate chi-square (math.)
	Check	<i>df</i>
		<i>p</i> -value
Medical Service	KMO	0.975
	Bartlett Sphericity	Approximate chi-square (math.)
	Check	<i>df</i>
		<i>p</i> -value

Regarding the validity of the 600 questionnaires, the KMO values for CME, risk education and healthcare services were 0.985, 0.966 and 0.975 respectively, these three values were higher than 0.9, indicating that the questionnaires were well suited for information extraction, and the validity was analyzed by the Bartlett's test, which corresponded to *p*-values less than 0.05.

This study analyzed the Pearson correlation statistics between CME and risk education on the results of the Pearson correlation statistics data analysis: the significant positive correlation between CME and risk education suggests that efforts to enhance one variable correlate with improvements in the other, thus reinforcing the importance of integrating both educational initiatives for comprehensive healthcare professional development.

This study provided a comprehensive analysis of Pearson's correlation statistics between risk education and various aspects of medical services, the statistical significance indicated by various correlations ($p < 0.01$) emphasizes the robustness of these relationships and underscores the critical role of continuing medical education in improving the standard of medical services in tertiary public hospitals, *p*-values of less than 0.05 are generally considered statistically significant indicating that the correlations are unlikely to be due to random chance.

This study conducted a comprehensive Pearson correlation analysis between CME and various aspects of medical services to assess the impact of CME on improving the quality of medical services by examining the relationship between specific CME activities and improvements in various aspects of medical services. The correlation coefficients between CME activities and medical services improvement indicate the strength and direction of the relationship. Positive correlations indicate that greater participation in CME activities is associated with greater improvement in medical services. The significance ($p < 0.01$ or $p < 0.05$) and direction (positive) of correlations between multiple variables indicate that CME positively influences improvement in medical services, and the correlation coefficients indicate the strength of these relationships. The correlation coefficients of CME activities and medical services improvement were analyzed by examining the relationship between CME activities and medical services improvement.

DISCUSSION

Hypothesis 1: The impact of CME on risk education for medical staff is positive and significant.

This study showed a significant positive correlation between CME and medical staff risk education, indicating that efforts to enhance CME are directly related to improvements in risk education. This supports the hypothesis that CME has a positive and significant impact on medical staff risk education.

Hypothesis 2: The impact of risk education for medical staff on medical services is positive and significant.

This study showed a strong and statistically significant positive correlation between risk education for medical staff and medical services, which confirms that risk education for medical staff has a positive impact on the quality and effectiveness of medical services.

Hypothesis 3: The impact of CME on medical services is positive.

The combined analysis of CME activities and medical services improvement also showed a positive correlation, supporting the hypothesis that CME has a positive impact on medical services. The correlation coefficients indicate a strong relationship, suggesting that greater participation in CME activities leads to improved medical services.

CONCLUSION

In this study, it can be tentatively concluded that the impact of CME on medical staff risk education is positive and significant, the impact of medical staff risk education on medical services is positive and significant, and the impact of CME on medical services is positive. These findings provide strong evidence to support the important role of CME in improving the quality of medical services and risk education. This provides a reference for the development and implementation of targeted CME strategies in tertiary public hospitals in China, which can help to improve the quality of medical services, reduce medical risks, enhance patient satisfaction, and promote doctor-patient harmony.

This study recommends that the hospital CME management system be improved, and that incentives and appraisal systems be established to integrate the CME and risk education (medical errors, risk awareness) are linked to enhance the level of hospital medical services. Provide theoretical basis and practical guidance, strengthen policy publicity and guidance, raise medical staff's awareness of and attention to CME, improve the quality of CME courses in response to medical staff's needs, focus on practicality and innovation, strengthen the construction of CME faculty, and improve the level of teaching.

ACKNOWLEDGEMENTS

I would like to express my sincere thanks to Suan Sunandha Rajabhat University for invaluable help throughout this research.

REFERENCES

- Wu, DY, Guo, M., & Xu, C. y. (2021) . The development of continuing medical education in China. *Creative education*, 12, 203-211.
- Simon Kitto et al. (2013). (MIS) Perceptions of continuing education: insights from Knowledge translation, quality improvement, and patient safety leaders. *Journal of continuing education in the health programs*, 33 (2): 81 – 88.
- Simon Kitto et al. (2015). Quality improvement, patient safety, and continuing education: a qualitative study of the current boundaries and opportunities for collaboration between these domains. *Academic medicine*, Vol. 90, No. 2/February 2015.
- Filipe HP, Mack Hg, & Golnik Kc. (2017). Continuing professional development: progress beyond continuing medical education. *Ann eye sci* 2017, 2: 46.

Accreditation Council for continuing medical education 2021 ACCME data report 2022. Accessed December 12, 2022.

https://www.accme.org/sites/default/files/11/2021%20ACCME%20Data%20Report%20967_20221109_0.pdf