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IMPLEMENTATION OF COMPETENCY-BASED EDUCATION (CBE) IN HEALTH EDUCATION: A SCOPING REVIEW

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Abstract: *Health practitioners need to integrate new skills and knowledge to meet the demands of the global era. Competency-Based Education (CBE) is a promising alternative compared to conventional approaches. This study explores the application of CBE in health education, improvement of clinical competencies, challenges, and potential solutions. The research uses the Scoping Review method with five steps to synthesize existing literature, followed by an in-depth analysis using the Population, Exposure, Outcome (PEO) approach. Data collection was carried out from April 2024 to June 2024. The results of the study show that CBE significantly improves the clinical competencies of health practitioners and enhances learning effectiveness.*

Keywords: *competency-based education, education, dan health education.*

INTRODUCTION

In the era of globalization and the advancement of information technology, health practitioners are faced with increasingly complex demands in providing quality and up-to-date health services to the community. Healthcare organizations and institutions face many problems, such as new clinical techniques and lack of resources. However, healthcare providers are required to be able to utilize nursing skills and apply theoretical knowledge into clinical service practice (Goudreau et al., 2015).

The development of science and technology in the health sector has changed the dynamics of the health profession so that it requires practitioners to continue to develop competencies in accordance with the latest scientific developments (Jarrett et al., 2024). However, in practice, the health education system still relies heavily on conventional approaches and often fails to meet these needs effectively (Siti, 2021).

Conventional education has undergone rapid reforms around the world in recent decades, towards Competency-Based Education (CBE) or competency-based education at all levels and types of education (Slavcev et al., 2013). The CBE approach is used as an alternative to prepare health practitioners to face the demands of an increasingly complex era. The CBE promotes greater adaptability and accountability through learner-centered learning and places emphasis on the development of relevant competencies and practical skills necessary to perform clinical tasks effectively (Morcke et al., 2013).

Health professions education globally has been influenced by the adoption of the CBE approach. Some authors report positive results related to the application of this model in their educational programs (Barsuk et al., 2012). Although the concept of the CBE approach offers great potential in improving the quality of health education, its implementation still faces various challenges. The difficulties faced in determining the most relevant competencies to the development of appropriate evaluation methods, there are still many aspects that need to be considered in implementing the CBE approach effectively.

Competency-Based Education (CBE) is now increasingly recognized as a transformative approach in health education, with a focus on developing specific competencies that meet the evolving demands of the health sector. Several studies have found that the application, assessment, and outcomes of CBEs in health education show the

potential to prepare health workers who are more adaptive and ready to face new challenges. The CBE addresses the need for health professionals to respond to emerging public health challenges, by training graduates for careers in fields beyond academia (O'Leary et al., 2024). Effective implementation of CBE requires structured approaches, such as team-based strategies and faculty training, that contribute to the suitability of implementation and the results achieved (A. M. H. Chen et al., 2024). Core competencies prioritized in the CBE, such as communication and leadership skills, are increasingly becoming the focus of the program to ensure graduates are ready to face real challenges (O'Leary et al., 2024). In addition, the integration of digital technology in health education also strengthens the importance of developing digital competencies for students and educators (Martinez-Bueso et al., 2023).

The evaluation of CBE programs uses a variety of methods, whether qualitative, quantitative, or mixed, to assess knowledge, skills, and attitudes, demonstrating variations in effectiveness across different health disciplines. Innovative teaching approaches such as case-based learning and community engagement are also being applied to improve structural competencies, especially in addressing health inequalities (Gholar et al., 2023).

In the context of health education, a learning approach that encourages creativity in thinking, problem-solving, and interaction between students can be a strong foundation for implementing the CBE approach (Murnie, 2020). Thus, the application of a problem-solving approach in health education can provide significant benefits to improve students' ability to understand and overcome challenges in the health sector.

This article aims to explore the application of CBE in health education, focusing on how CBE can improve the clinical competence of health practitioners, identify challenges in its implementation, and present possible solutions to overcome these challenges. This study also aims to examine the benefits that can be obtained from the application of CBE in health education and how this approach can improve the quality of graduates who are ready to meet the demands of the profession and the expectations of society.

The study identifies challenges in the implementation of CBE and offers potential solutions as a guide for health education institutions. These findings can be used by policymakers and health institutions to design competency-based curricula that are more in line with the needs and challenges of the field.

RESEARCH METHODOLOGY

The field of evidence-based healthcare continues to progress. With the increasing number of primary research available, the review process is also evolving. This development has led to the creation of new approaches to synthesizing evidence in a more effective and thorough manner, in accordance with different types of evidence and the objectives and questions of the review (JBI, 2023). In conducting a literature review, the author uses Scoping Review as a research design. Scoping Review is an evidence synthesis method that aims to systematically identify and map the extent of the evidence available on a particular topic, field, concept, or issue, regardless of the source (such as primary research, review, or non-empirical evidence) in a given context (Munn Z, 2022). Therefore, Scoping Review can provide the basic information necessary for research (Adik Wibowo, 2021). The method used is a five-step Integrative Review, which aims to obtain broader and relevant information to the topic being researched (Oermann & Knafl, 2021).

Problem Identification

Creating a research question is a very important first step (Thomas et al., 2017). In light of the growing interest in the CBE learning model, this article reviews the literature on CBEs to answer the following questions:

1. What is CBE?
2. What are the characteristics of the CBE program?
3. What are the benefits of CBE in Health Education?
4. How is CBE applied in the Health Education Curriculum?
5. What are the challenges and what are the solutions in the implementation of CBE in Health Education?

To make it easier to answer the research questions, this study uses the *Population, Exposure, Outcome* (PEO) approach as described in table 1. This framework serves to help formulate research questions in a clear and structured manner. PEO helps identify the population being researched (Population), the exposure or risk factors to be researched (Exposure), and the outcomes or outcomes observed (Outcome). By using a PEO framework, researchers can direct the focus of research, facilitate the collection of relevant data, and develop a more focused analysis of the relationship between exposure and outcomes in a given population.

Table 1. PEO Framework

Population	*Exposure*	*Outcome*

Healthcare practitioners	*Implementation of Competency-Based Education (CBE)* (Penerapan CBE)	*Enhanced clinical competencies*

Literature Research

The keywords used are *competency-based education, education, health education*. These keywords are used to find relevant articles in Scopus and Sage Journal. The results obtained are then exported to Mendeley for sorting starting from duplicate files, sorting by titles that do not match the topic, sorting by abstract to sorting based on the content of full text. The data collection process was carried out in April 2024-June 2024.

Data Evaluation

When conducting a litter search, it is very important to establish Inclusion and Exclusion Criteria. By establishing inclusion and exclusion criteria, it can make it easier to filter relevant articles for literature review. In the search for this article, the inclusion and exclusion criteria set are the type of study, population, main topic, language, source and time of publication. regarding the application of CBE in health education. The process of screening papers involves reading not only the title, but also the abstract and reading the entire body of the text, as shown in table 2.

Table 2. Inclusion and Exclusion Criteria

Criterion	*Inclusion*	*Exclusion*
Type of Study	*Literature review, qualitative study, quantitative study, meta-analysis on CBE in health education.*	*Opinion articles, editorials, comments, non-peer-reviewed articles.*
Population	Health practitioners (doctors, nurses, midwives, other health workers).	Non-medical population.
Key Topics	Focus on the application, benefits, and challenges of CBE in health education.	Not discussing the CBE or only mentioning it at a glance.
Language	English or Indonesian.	Languages other than English or Indonesian without official translation.
Date	Published in the last 5 years.	Published over the last 5 years
Source	Trusted and indexed scientific journals or scientific conferences.	Non-scientific or unindexed sources in a trusted academic database.

Data Analysis

Articles that meet the criteria are entered into a data extraction table which includes: Title of the article and year, country where the study is placed, research objectives, research methods and instruments used, population and sample in the study and the last is the results of the research.

No	Title & Author	Objective	Study design, Sample, Variable, and Instrument	Summary of Results
1.	The Effectiveness of the Implementation of Competency-Based Education in Vocational Education and Training (VET) System (Siswahyudi et al., 2022)	Discussing the effectiveness of implementing competency-based education in the vocational education and training (VET) system.	Study Design : Literature Review Sample: Sample consists of 12 online journal articles from 2016 to 2022 Variable: effectiveness of competency-based education in the VET system Instrument: documentation of library sources, namely online	Competency-based curriculum is effective in improving students' skills to face the world of work.

			journal articles	
2.	Does implementation of competence-based education mediate the impact of team learning on student satisfaction? (Griethuijsen et al., 2019)	Examining the relationship between the learning activities of the teacher team, the implementation of Competency-Based Education (CBE), and student satisfaction in vocational education.	Study Design: Quantitative Sample Managers and teachers in vocational education institutions Variable CBE implementation, Student satisfaction Instrument : Questionnaire	CBE implementation has a positive relationship with student satisfaction with the quality of education, guidance, and interpersonal skills development
3.	A systematic review of contemporary competency-based education and training for pharmacy practitioners and students (Mcmullen et al., 2023)	Researching pharmacy education and training to identify features of CBE-related approaches	Study Design: Literature Review Sample: English language studies from 2010 to 2021. Variable: Studies related to CBE or pharmacy practitioner training. Instrument: Electronic database.	A collective understanding of the concept of competence, combined with a shared vision between education, regulation, and practice, underlies the successful implementation of the CBE approach.
4.	Competency-based education in pharmacy: A review of its development, applications, and challenges (Gamal et al., 2020)	Provides an overview of the application of CBE in pharmacist education and training, the process of preparing a competency-based pharmacy curriculum, as well as the potential benefits and challenges associated with its implementation.	Study Design: Literature Review Samples: related topics (from 1975 to 2019) Variable: competency development and competency framework/standards for the pharmaceutical profession Instrument : Electronic database	The adoption of CBPE can enhance the ability of pharmacy education to meet the rapidly growing needs of public health services.
5.	Integrating competency-based education with a case-based or problem-based learning approach in online health sciences (Sistermans, 2020)	Identify online learning for health science programs and identify challenges in online learning when integrating competency-based education.	Study Design: Qualitative Sample: higher education professionals in the field of Health Sciences Variables: best practices and challenges of online learning as well as learning activities suitable for health science programs in higher education. Instrument: standardized open interview	Online learning that supports competency-based education, problem-based learning, and case-based learning. However, the study also found challenges related to logistics, administration, and Learning Management System (LMS) capabilities
6.	The effect of competency-based education on clinical performance of health care providers: A systematic review and meta-analysis.	Investigate the effects of competency-based education on the clinical performance of healthcare providers.	Study Design: Literature Review Sample: all studies selected from international and national databases, according to predetermined inclusion criteria. Variables: CBE, clinical	Competency-based education may improve the clinical performance of healthcare providers in the intervention group compared to the control group

	(Imanipour et al., 2022)		performance of doctors, nurses, medical students, and nursing. Instrument : Electronic database	
8.	Perceptions and barriers to competency-based education in Canadian postgraduate medical education (Hba et al., 2020)	Describe the initial experience of implementing competency-based medical education (CBME) and highlight perceptions and barriers	Study Design: Quantitative Sample: Program leader, Resident, Director of neurology program. Variable: perception of CBME Instrument: Questionnaire	The study shows the faculty's positive perception of CBME, but residents face obstacles such as lack of institutional preparation and challenges in feedback.
9.	Evaluating the Strengths and Barriers of Competency-Based Education in the Health Professions (Jarrett et al., 2024)	This study aims to define CBE for pharmacy education and explain how the strengths and barriers of CBE can support or hinder its implementation.	Study Design: Narrative synthesis Sample: Articles related to CBE in health professions education Variable: CBE strength and resistance Instrument: documentation of library sources, namely online journal articles	CBEs can increase the effectiveness and efficiency of pharmacy education by emphasizing competencies for safe and quality practices. However, challenges such as faculty development, collaboration between pharmacy and residency programs, and the integration of quality feedback need to be addressed for successful implementation.
10	The critical role of infrastructure and organizational culture in implementing competency-based education and individualized pathways in undergraduate medical education (Lomis et al., 2021)	The purpose of the study is to outline how schools in the American Medical Association Accelerating Change in Medical Education Consortium develop and implement CBME.	Study Design :Mixed-methode Sample :AMA medical student Variables: Challenges, successes, and supporting factors for CBE development Instruments: interviews, surveys and document analysis	The results show that the success of CBME depends on organizational culture change, infrastructure support, and leadership commitment to a flexible and individualized competency-based learning approach.
11	Competency-Based Education: Developing an Advanced Competency Framework for Indonesian Pharmacists (Meilianti et al., 2021)	The purpose of this study is to develop and validate the advanced practice competency framework for the pharmaceutical workforce	Study Design: Online mixed-method survey Sample : pharmacists throughout Indonesia Variable: development of pharmaceutical competency framework Instrument : Survey	The results of the study show that the development of an education-based competency framework has succeeded in creating the Indonesian Advanced Competency Framework (IADF), which supports the career advancement of pharmacists in Indonesia.
12	Application of competency-based education in the	The purpose of this study is to describe the experience of	Study Design: Quantitative Sample: Head of the Faculty of Training, Members of the	The study showed that out of 84 hospitals, 68 participated in the CCE

	Korean anesthesiology residency program and survey analysis (Kim et al., 2023)	the implementation and evaluation of the CBE program pilot conducted by the Korean Society of Anesthesiologists.	Faculty of Training and Residents Variable : Implementation of the CBE program on CCE Instrument : Survey using questionnaire	pilot evaluation. The survey response rate was 55.9% for faculty chairs, 10.2% for faculty members, and 30.2% for residents. The results can help improve the quality of resident education and build CBE.
13	Clinical competency of nurses trained in competency-based versus objective-based education in the Democratic Republic of the Congo: a qualitative study (Nagai et al., 2024)	The purpose of this study is to conduct qualitative triangulation of the results of self-evaluation by exploring the perception of supervisors, CBE trained nurses, and OBE-trained nurses regarding the competence of each type of nurse.	Study Design: Qualitative descriptive approach with conventional content analysis. Sample: • Twenty interviews with clinical supervisors supervising CBE and OBE trained nurses. • 22 focus group discussions (FGDs) with CBE trained nurses. • 21 FGDs with OBE-trained nurses who are currently working in health facilities. Variable: • Professional competencies of CBE and OBE trained nurses • Supervisors' perceptions of nurse competencies • Challenges and obstacles in the application of competencies in the clinical environment. Instrument: Interview and FGD	The supervisors acknowledged that nurses trained with CBEs had stronger competencies in professional communication, decision-making on health issues, and involvement in professional development, but were weak in clinical skills.
14	A survey of resident physicians' perceptions of competency-based education in standardized resident training in China: a preliminary study (Chen et al., 2022)	The purpose of this study is to understand how the perception of resident doctors towards CBME can affect the way the education is applied in SRT.	Study Design: Quantitative with a Cross-sectional approach Sample: Resident doctor undergoing SRT in China. Variable: Residents' perception of competency-based education Instrument : Survey using questionnaire	The study shows that the residents analyzed in this survey have a positive perception of the integration of CBME in SRT in China.

RESULTS AND DISCUSSION

Result

Literature reviews play an important role in academic research by building a foundation for inquiry (Xiao & Watson, 2017). Conducting a literature review is important because it can help in identifying, analyzing, assessing, and interpreting existing research in this regard regarding the application of the CBE approach in health education (Keeping Up with Prahmana, 2021). By summarizing findings and disseminating information, literature reviews contribute to the sustainability and improvement of educational programs.

Presentation of Findings

In the initial stage, articles were identified from two main sources, namely Scopus with 3,873 records and Sage Journal with 4,282 records. After the initial identification, a number of records are deleted before entering the screening stage. The number of duplicate records deleted totaled 1,703, while the records deleted for other reasons reached 2,800. Thus, as many as 3,652 recordings are ready for the next screening stage. From the results of the screening, 2,801 recordings were eliminated because they did not meet the inclusion criteria that had been set. Furthermore, a total of 851 reports were selected for further collection and assessment process. However, 525 of these reports were not successfully retrieved, so 326 reports were left to be assessed for feasibility. The assessment of these reports involves evaluating the title, abstract, and full text. The results of this assessment showed that 217 reports were issued based on full titles, 79 reports were issued based on abstracts, and 15 reports were issued after full-text evaluation. Finally, a total of 15 studies that met all inclusion criteria were included in this scope review.

The selection of studies in this Scoping Review is reported using the Preferred Reporting Items for Systematic Review or Meta-Analysis (PRISMA) shown in Figure 1.

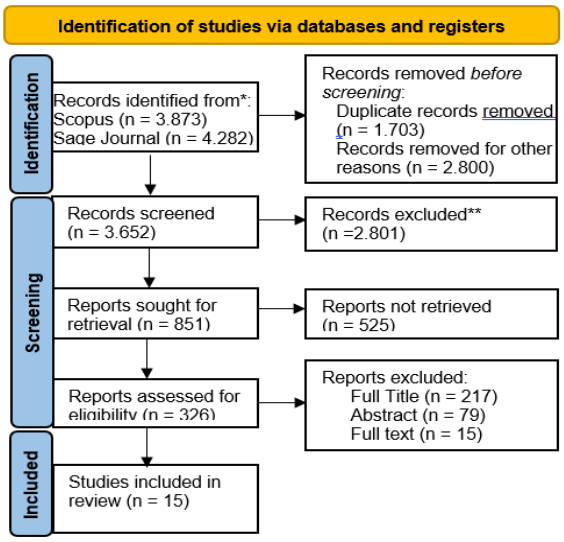

Figure 1. PRISMA FLOW Chart

Discussion

Theme	*References*
Competency-Based Education (CBE)	4,6,12,15,18

Characteristics and Benefits of CBE in Health Education	4,9,11,12,15,25
Application of CBE in the Health Education Curriculum	4,10,12,14,15,17
Challenges and Solutions in the Implementation of CBE	10,11,12,14,15,17

Competency-Based Education (CBE)

The Competency-Based Education (CBE) approach emphasizes the mastery of certain competencies by students and aims to ensure graduates have relevant abilities that can be applied in real practice, especially in health education. CBE focuses on developing practical skills and knowledge for effective clinical tasks (Nagai et al., 2024). CBE is not only dependent on the time spent on learning but rather on achieving the specific learning outcomes required for professional practice. This supports a student-centered approach that allows for learning at their own pace (Lomis et al., 2021).

In the context of health education, such as pharmacy and medicine, the CBE provides an outcome-based curriculum framework that is organized according to the competency framework (knowledge, skills, and attitudes) needed to meet the health needs of the community (Gamal et al., 2020; Jarrett et al., 2024; Meilianti et al., 2021). In addition, in medical education, it is also known as CBME (Competency-Based Medical Education), which focuses on developing specific clinical and professional competencies to ensure all students have the knowledge, skills, and behaviors needed for safe and effective patient care (Q. Chen et al., 2022).

CBE enables student-centered, self-directed, and experiential learning, facilitating the development of higher-order thinking and problem-solving skills, which is in line with the learner-centered approach proposed by Sistermans (2020). CBE programs demonstrate characteristics such as clear and measurable competency assignments, tailored learning experiences both in the classroom and in the workplace, and coordinated programmatic assessments (Lomis et al., 2021).

Characteristics and Benefits of CBE in Health Education

The Competency-Based Education program is characterized by a focus on achieving organized outcomes within the framework of competence, the use of authentic teaching strategies, workplace-based assessments, and quality feedback (Jarrett et al., 2024). The CBE begins by identifying core competencies and issues that students may face in the workplace, which are then integrated into the curriculum to ensure relevance and applicability (Griethuijsen et al., 2020). This approach increases student readiness for increased care responsibilities, facilitates lifelong learning, and encourages the development of interprofessional teamwork skills and adaptation to the needs of the community (Lomis et al., 2021).

CBE has been shown to increase student satisfaction by providing a learning experience focused on developing the competencies required in the field (Griethuijsen et al., 2020). In the healthcare sector, this approach also improves the quality of medical education and training by providing students with a clear framework, preparing them for real clinical challenges and enabling personalised education tailored to individual needs (Q. Chen et al., 2022; SISWAHYUDI et al., 2022). CBE is also seen as a cost-effective learning approach, with a focus on developing, implementing, evaluating, and assessing curriculum that is oriented towards student performance (Imanipour et al., 2022).

Application of CBE in the Health Education Curriculum

The application of CBE in health education curricula involves developing curricula responsive to local needs and 21st-century health challenges, the integration of active learning experiences, and ongoing competency-based assessments (Lomis et al., 2021). In addition, it is important to provide training for teaching faculty on CBE and

competency evaluation, as well as the implementation of competency-based evaluation that involves feedback from faculty and students (Kim et al., 2023). The use of authentic teaching methods and workplace-based assessments is key in ensuring student progress towards the expected competencies (Jarrett et al., 2024).

CBE offers flexible completion timeframes, allowing learners to progress at their own pace. This learner-centered approach encourages personal development by charting a path from one milestone to the next on their journey to achieving competence (Mcmullen et al., 2023). The implementation of CBE produces students with a sufficient understanding of the objectives, training content, and assessment systems, as well as providing in-depth exposure to clinical practice and greater involvement in patient management (Q. Chen et al., 2022; Hba et al., 2020).

Challenges and Solutions in the Implementation of CBE

However, the implementation of CBE faces various challenges such as the lack of understanding of students and faculty about their roles, the limitations of information technology that supports assessment, and resistance to changes from traditional teaching methods (Hba et al., 2020). These challenges also include the changing organizational culture required to support this new approach, as well as the difficulties in transforming traditional assessments into formative ones that focus on learning (Lomis et al., 2021).

Difficulties in defining, developing, implementing, and assessing competencies are a significant challenge in the adoption of CBE. To address these challenges, proposed solutions include providing adequate administrative and educational support, training for faculty on feedback and assessment, and encouraging the development of learners to take ownership of their learning (Hba et al., 2020; Kim et al., 2023).

Building a shared vision and strong leadership is also critical to a successful conversion to CBE. Organizations need to prepare and outline their vision through working groups, steering committees, retreats, and workshops to mitigate potential challenges (Imanipour et al., 2022). In addition, it is important to train educators and students on the concept of competence, including familiarizing them with the competency framework and CBE principles, which form the basis for effective implementation (Jarrett et al., 2024; Mcmullen et al., 2023).

CONCLUSION

The Competency-Based Education (CBE) approach offers a new paradigm in health education by emphasizing the mastery of certain competencies by students. The CBE aims to ensure that graduates have relevant abilities that can be directly applied in real practice, especially in the field of health education such as medicine and pharmacy. The CBE focuses on developing the practical skills and knowledge necessary for effective clinical assignments, and this has shown an improvement in practitioners' clinical competence as well as student satisfaction. Additionally, CBE supports student-centered learning, allowing them to learn at their own pace and needs. In the context of health education, CBE provides an outcome-based curriculum framework, structured in accordance with the competency framework needed by practitioners to meet the needs of the community.

The CBE also emphasizes the use of authentic teaching strategies, workplace-based assessments, and quality feedback. This approach facilitates the development of higher-order thinking skills, problem-solving, as well as interprofessional collaboration among students. The implementation of CBEs in health education curricula has been shown to improve students' readiness to face greater care responsibilities, encourage lifelong learning, and facilitate adaptation to the needs of the community.

However, the implementation of CBE faces various challenges, including the lack of understanding of students and faculty regarding their roles, the limitations of information technology to support assessment, and resistance to changes from traditional teaching methods. These challenges require changes in organizational culture and assessment systems to ensure the successful implementation of the CBE.

To address challenges in the implementation of CBE, adequate administrative and educational support is required, including training for faculty on feedback and competency-based assessments. Organizations need to build a strong shared vision to support the conversion to CBE. This vision must be communicated effectively through working groups, steering committees, retreats, and workshops, in order to reduce resistance and challenges that may arise. In addition, educators and students need to be familiar with the concept of competence, competency framework, and CBE principles. Providing intensive and ongoing training for faculty and students on the implementation of CBE is essential to ensure a deep understanding and consistency in the

implementation of this approach.

The limitations of this study include the use of the Scoping Review method which only maps the available literature without in-depth analysis of the empirical effectiveness of the implementation of Competency-Based Education (CBE) in various contexts. In addition, another limitation is the limited scope of data sources in the Scopus and Sage Journal databases, which may not include all related literature.

For further research, it is recommended that an empirical study be conducted to measure the effectiveness of the implementation of CBE in direct health education. Additionally, using more diverse data sources will help provide a broader view of CBE implementation in different countries and health sectors.

In the long term, an ongoing assessment of the effectiveness of CBEs should also be conducted to ensure that health education programs remain relevant and adaptive to changing needs and challenges in the field. Thus, CBE can continue to provide benefits to students, faculty, and the health care system as a whole.

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