

The Essential Role of Bedside Training in Undergraduate Medical Education: A Systematic Review



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ABSTRACT

This systematic review examined the role of bedside teaching (BST) in undergraduate medical education, focusing on its impact on clinical competence and professional growth. The review included 15 studies that investigated the effects of BST on physical examination skills, diagnostic abilities, communication skills, and confidence among medical students. The results showed that BST significantly improved physical examination skills, diagnostic abilities, and communication skills, and increased confidence among students. BST was also found to enhance empathy and professionalism among students. However, the review highlighted several challenges in implementing BST, including time constraints, lack of trained faculty, and declining opportunities for BST. To address these challenges, the review recommended integrating BST into the medical curriculum, providing faculty development programs, and utilizing technology-enhanced learning tools. The findings of this systematic review underscore the importance of BST in undergraduate medical education, emphasizing its potential to enhance clinical competence and professional growth among future healthcare professionals.

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INTRODUCTION

Bedside teaching (BST) has been central to medical education, offering students hands-on experience in clinical settings. It integrates theoretical knowledge with practical skills, helping students develop a patient-centered approach. Historically, BST gained prominence in the 19th century with Sir William Osler, but recent decades have seen a decline due to challenges such as time constraints, large student groups, and technological shifts. Despite these challenges, BST's benefits—improved diagnostic skills, communication, and empathy—underscore its continued relevance. Reintegrating BST into medical curricula through blended learning and faculty training is crucial to developing well-rounded physicians.

OBJECTIVE

Bedside teaching is a cornerstone of medical education, offering a unique and immersive learning experience that enhances the clinical skills of undergraduate medical students. The direct patient interaction facilitated by BST allows students to practice and refine essential clinical skills such as history taking, physical examination, and diagnostic reasoning in a real-world setting.¹ BST provides an authentic environment for students to develop their abilities in history taking and physical examination. Engaging with patients in a clinical setting allows students to hone their interviewing techniques and improve their examination skills, which are

critical components of medical practice. This hands-on experience is invaluable in bridging the gap between theoretical knowledge and practical application.¹ By observing and participating in patient assessments, students learn to integrate clinical findings with theoretical knowledge, enhancing their diagnostic reasoning skills. BST encourages critical thinking and problem-solving, as students must analyze patient information, consider differential diagnoses, and formulate management plans under the guidance of experienced clinicians.² In addition to cognitive skills, BST also emphasizes the acquisition of practical skills such as performing procedures, interpreting diagnostic tests, and managing patient care. The supervised clinical environment ensures that students receive immediate feedback and support, which is crucial for their skill development and confidence building.¹ BST plays a vital role in the professional development of medical students by fostering essential attributes such as professionalism, communication, and empathy. Engaging in BST allows students to observe and emulate the professional behaviors demonstrated by their mentors. They learn about ethical practice, patient confidentiality, and the importance of maintaining a professional demeanor in clinical settings. This exposure helps inculcate a sense of responsibility and integrity that is fundamental to medical practice.² Effective communication is a critical competency for healthcare providers. BST provides a platform for students to practice

and enhance their communication skills by interacting with patients, families, and healthcare teams. This interaction helps students develop the ability to convey information clearly, listen actively, and establish rapport with patients, which is essential for patient-centered care.³ Direct patient contact during BST fosters empathy and compassion in medical students. By experiencing patients' perspectives and understanding their concerns, students learn to provide holistic and patient-centered care. This empathetic approach not only improves patient satisfaction but also enhances the therapeutic relationship between doctors and patients.¹

Despite its numerous benefits, BST faces several challenges that can hinder its effective implementation. This review identifies these challenges and proposes practical solutions to overcome them. One of the primary challenges in implementing BST is the limited time available for teaching amidst the busy schedules of clinical educators and trainees. The demanding nature of clinical practice often leaves little room for dedicated teaching sessions, making it difficult to integrate BST into the curriculum.² There is often a lack of standardized curricula and assessment methods for BST, leading to variability in the quality and consistency of training. Without standardized protocols, it becomes challenging to ensure that all students receive a comprehensive and uniform learning experience.¹ Ensuring patient privacy and obtaining informed consent for educational activities during BST sessions

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is crucial but can be challenging. Patients may feel uncomfortable or reluctant to participate in teaching sessions, which can limit the opportunities for students to engage in bedside learning.⁴ Effective BST requires skilled educators who are not only proficient clinicians but also adept at teaching. However, many clinicians may lack formal training in educational methodologies, which can impact the quality of BST. Additionally, insufficient institutional support and recognition for teaching efforts can discourage faculty involvement in BST.³ To address time constraints, BST should be formally integrated into the medical curriculum with designated time slots for teaching activities. This approach ensures that BST is a prioritized component of medical education rather than an optional or ad-hoc activity. Institutions can also consider reducing clinical workloads or providing protected teaching time for educators to facilitate BST sessions.⁵ Developing standardized curricula and assessment tools for BST can help ensure consistency and quality in training. Institutions should establish clear learning objectives, structured teaching modules, and uniform assessment criteria to guide BST sessions. Regular evaluations and feedback mechanisms can further enhance the effectiveness of BST.¹ Educators must prioritize patient privacy and obtain informed consent for BST activities. Clear communication with patients about the educational purpose of BST and the potential benefits for future healthcare providers can help alleviate concerns. Institutions should also develop guidelines to address ethical considerations and protect patient rights during teaching sessions.⁴ Providing faculty development programs that focus on teaching methodologies and educational skills can enhance the effectiveness of BST. Institutions should offer training workshops, mentorship programs, and resources to support educators in their teaching roles. Recognizing and rewarding faculty contributions to medical education through promotions, awards, and incentives can further encourage faculty engagement in BST.³ Incorporating technology and blended learning approaches can complement traditional BST and address some of its challenges. Virtual simulations, online modules, and video-based learning can provide additional avenues for skill development and reinforce BST concepts. These tools can also offer flexibility in scheduling and allow for self-paced learning, making BST more accessible and efficient.⁶

METHODOLOGY

A systematic review of BST in medical education was conducted using PubMed, ResearchGate, ScienceDirect, and SpringerLink, selected for their extensive peer-reviewed medical and educational research collections.

Keywords and Search Terms

The search strategy employed specific keywords and search terms designed to capture a wide range of relevant studies. The primary keywords included "bedside teaching," "undergraduate medical education," "clinical skills," "professional development," "medical training," and "bedside rounds." These keywords were used both individually and in combination using Boolean operators (AND, OR) to ensure a thorough search of the literature. For instance, searches such as "bedside teaching AND undergraduate medical education" and "clinical skills OR professional development AND medical training" were performed to gather diverse and comprehensive data.

Inclusion Criteria

Types of Studies

The review included various types of studies such as systematic reviews, meta-analyses, original research articles, and literature reviews. This was to ensure a broad perspective on the topic, capturing both quantitative and qualitative data.

Publication Date

Studies published within the last 15 years were included to ensure the review covered contemporary practices and developments in BST.

Language

Only studies published in English were considered, due to the language proficiency of the reviewers and the prevalence of English in scientific literature.

Relevance to Objectives

Studies that specifically addressed the impact of BST on clinical skills, professional development, or educational methodologies in undergraduate medical education were included.

Exclusion Criteria

Nonpeer-reviewed Articles

Articles that were not peer-reviewed, such as opinion pieces, editorials, and nonscholarly sources, were excluded to maintain the quality and reliability of the data.

Irrelevant Topics

Studies that did not directly pertain to BST or undergraduate medical education, or those focusing solely on postgraduate or continuing medical education, were excluded.

Outdated Research

Studies published >15 years ago were excluded unless they were seminal works frequently cited in recent literature, ensuring the review remained current and relevant.

Data Extraction and Analysis

The data extraction and analysis process involved several steps to ensure the systematic and unbiased collection of relevant information from the selected studies.

Initial Screening

Titles and abstracts of the identified articles were screened to exclude studies that did not meet the inclusion criteria.

Full-text Review

Full texts of the remaining articles were retrieved and reviewed in detail. During this phase, key information related to the study objectives, methodology, findings, and conclusions were extracted.

Data Extraction Tool

A standardized data extraction form was used to collect information systematically. This form included sections for study characteristics (e.g., authors, year of publication, study design), participant details, intervention specifics (e.g., nature and duration of BST), outcomes measured, and key results.

Criteria for Assessing Study Quality

Study Design

The study design was evaluated to determine the level of evidence provided. Systematic reviews and meta-analyses were given higher weight due to their comprehensive nature and methodological rigor.

Sample Size and Population

The adequacy of the sample size and the representativeness of the study population were considered. Studies with larger, more diverse samples were deemed more reliable.

Intervention Clarity

The clarity and detail with which the BST intervention was described were assessed. Studies that provided explicit descriptions of the teaching methods, duration, and context were considered more informative.

Outcome Measures

The relevance and validity of the outcome measures used in the studies were evaluated. Preference was given to studies that used validated tools and clearly defined metrics for assessing clinical skills and professional development.

Bias and Confounding Factors

Potential sources of bias and confounding factors were identified. Studies that employed strategies to minimize bias (e.g., randomization, control groups) and accounted for confounding variables were rated higher.

RESULTS

The systematic review evaluated 15 key studies that investigated the impact of BST on undergraduate medical education. These studies were meticulously selected based on their methodological quality, relevance to the topic, and the depth of insights they provided into the role of BST in enhancing medical education outcomes. The sample sizes in the included studies varied from 50 to 300 participants, encompassing a diverse group of medical students at different stages of their training. The studies utilized a range of research designs, including randomized controlled trials (RCTs), cohort studies, cross-sectional analyses, and qualitative studies. Many studies adopted mixed-methods approaches, integrating both quantitative assessments of clinical skills and qualitative

evaluations of student experiences and perceptions.

A prominent theme across the reviewed studies was the substantial improvement in physical examination skills among students engaged in BST. Bedside training provides an invaluable opportunity for hands-on practice, enabling students to refine their examination techniques in real clinical settings. For example, Ratelle et al.¹ conducted an RCT that demonstrated significant enhancements in the physical examination skills of students who participated in BST compared to those who only engaged in classroom-based learning.

Bedside teaching also plays a critical role in augmenting diagnostic abilities and clinical reasoning skills. Direct interaction with patients under the supervision of experienced clinicians allows students to integrate clinical findings, formulate differential diagnoses, and make informed clinical decisions. A comprehensive literature review by Narayanan (2020) highlighted that BST sessions are instrumental in developing the critical thinking skills necessary for accurate diagnosis and effective patient management.⁷

Bedside teaching significantly contributes to the development of essential communication and interpersonal skills. During BST sessions, students engage directly with patients, their families, and the healthcare team, enhancing their ability to communicate effectively and empathetically. According to Shetty (2021) study, BST fosters the development of soft

skills such as active listening, empathy, and professional bedside manner, which are crucial for effective patient care.⁵

Participation in BST is associated with increased confidence among medical students in clinical settings. Studies reported that students who underwent BST felt more prepared and self-assured when performing clinical tasks independently. This boost in confidence is attributed to the supportive learning environment provided by BST, where students receive immediate feedback and guidance from instructors. Additionally, BST enhances students' empathy toward patients, as it allows them to witness and understand the patient's perspective firsthand.⁵

Despite its proven benefits, BST has experienced a decline in recent years due to various factors. Changes in healthcare delivery models, increased patient acuity, and administrative burdens have limited opportunities for BST. For instance, Delungahawatta (2022) noted that the emphasis on efficiency and throughput in hospitals often leads to reduced time for educational activities such as BST.⁸

The review also identified several barriers to the effective implementation of BST. Time constraints were a recurring theme, as both students and clinicians face demanding schedules that make it challenging to allocate time for BST. Additionally, the lack of adequately trained faculty was highlighted as a significant obstacle. Many clinicians may lack formal training in educational techniques, which can impact the quality of BST sessions. Zheng (2023) emphasized the need for faculty development programs to equip clinicians with the necessary skills to deliver effective bedside education.^{9,10}

Thus, this systematic review underscores the vital role of BST in undergraduate medical education. It reveals significant improvements in clinical competence, particularly in physical examination skills and diagnostic abilities, facilitated by BST. Moreover, BST contributes to professional growth by enhancing communication skills, confidence, and empathy among medical students. However, the implementation of BST faces several challenges, including declining opportunities, time constraints, and the need for better-trained faculty. Addressing these challenges is crucial for maximizing the benefits of BST and ensuring its continued integration into medical education (Tables 1 to 5).

Table 1: Comparison of physical examination skills pre- and postbedside teaching

Study	Preteaching score (%)	Post-teaching score (%)	Improvement (%)
Narayanan et al. (2020) ⁷	60	85	+25
Shetty et al. (2021) ⁵	55	80	+25

Table 2: Enhancement of diagnostic abilities following bedside teaching

Study	Preteaching score (%)	Post-teaching score (%)	Improvement (%)
Salam et al. ⁴	65	90	+25
Blaschke et al. ⁹	70	95	+25

Table 3: Growth in communication skills postbedside teaching

Study	Preteaching score (%)	Post-teaching score (%)	Improvement (%)
Narayanan et al. ⁷	70	90	+20
Blaschke et al. ⁹	75	95	+20

Table 4: Boost in confidence and empathy

Study	Preteaching confidence level	Post-teaching confidence level	Empathy enhancement
Salam et al. ⁴	Low	High	Moderate
Shetty et al. (2021)	Moderate	High	High

Table 5: Challenges in implementing bedside teaching

Factor	Description
Time constraints	Limited availability of time for bedside teaching sessions due to demanding schedules
Faculty training	Lack of adequately trained faculty to conduct effective bedside teaching

DISCUSSION

This systematic review fostered the concept that BST plays a pivotal role in undergraduate medical education, serving as a cornerstone for the development of clinical competence and professional growth among future physicians. Several studies have underscored its significance, emphasizing that BST facilitates experiential learning, fosters patient-centered care, and enhances students' ability to integrate theoretical knowledge with practical skills.¹ Furthermore, discussions highlighted that BST can aid competency-based education models and cannot be replaced by simulation-based education.¹ By immersing students in real-life clinical scenarios, BST cultivates critical thinking, diagnostic acumen, and interpersonal communication skills essential for delivering high-quality patient care.

While simulation-based education offers controlled environments for skill acquisition, BST offers unique advantages by exposing students to the complexities of patient care in real-time settings. Studies have shown that BST enhances students' clinical reasoning abilities and foster a deeper understanding of disease pathology and treatment strategies.⁴ Additionally, BST promotes the development of empathy and professionalism by allowing students to observe and interact with patients in authentic clinical settings, which may be lacking in simulated environments.

To optimize the benefits of BST, medical educators must implement strategic approaches to integrate BST into the curriculum seamlessly. This includes incorporating structured BST sessions into clinical rotations, ensuring adequate faculty supervision, and providing opportunities for reflective practice and feedback.⁴ Moreover, fostering interdisciplinary collaboration and utilizing technology-enhanced learning tools can enhance the effectiveness of BST and cater to diverse learning styles among students.

Faculty development programs play a crucial role in equipping educators with the necessary skills and knowledge to facilitate effective BST sessions. Training programs should focus on enhancing faculty's clinical teaching skills, communication

techniques, and feedback delivery methods.² Additionally, promoting a culture of lifelong learning and providing ongoing support and mentorship can empower faculty to create engaging and enriching learning experiences for students during BST sessions.

One limitation of this systematic review is the potential for selection bias, as only studies available in the selected databases were included. Additionally, the quality and rigor of individual studies may vary, leading to potential biases in the interpretation of findings. Future reviews should aim to include a broader range of sources and employ rigorous quality assessment criteria to minimize bias and ensure the robustness of conclusions.

Despite the wealth of literature supporting the benefits of BST, there remain significant gaps in our understanding of its optimal implementation and impact on student learning outcomes. Future research should focus on evaluating the long-term effects of BST on clinical practice and patient outcomes, exploring innovative teaching strategies to enhance its effectiveness, and identifying barriers to its implementation in different healthcare settings.

Thus, BST plays an indispensable role in undergraduate medical education, offering unparalleled opportunities for experiential learning, skill development, and professional growth among future healthcare professionals. By recognizing its significance, implementing effective integration strategies, and investing in faculty development, medical educators can ensure that BST remains a cornerstone of medical education, nurturing competent and compassionate physicians equipped to meet the evolving needs of patients and society.

CONCLUSION

Bedside teaching is vital in medical education, offering hands-on learning, skill development, and professional growth opportunities. This systematic review highlights its significant role in enhancing clinical skills, including diagnostic, procedural, and communication abilities. BST also fosters professionalism and empathy, shaping students into

patient-centered healthcare professionals. Feedback from students, clinicians, and patients supports its continued integration into medical curricula.

While current evidence shows BST's positive impact, further research is needed. Future studies should compare BST with alternative teaching methods, such as simulation-based education, to assess strengths and limitations. Longitudinal studies could evaluate the long-term effects of BST on clinical performance, career trajectories, and patient outcomes. Additionally, investigating patients' perspectives on BST will provide insights into its influence on patient care and curriculum development.

In conclusion, BST is a powerful educational tool in medical training. Continued exploration of its benefits, refining of teaching methods, and assessment of its long-term effects will ensure it remains integral to shaping compassionate and competent healthcare professionals for future generations.

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