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Teaching Procedural Skills Following Peyton's Four-Step Method: Bedside Teaching in Hospital Wards

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Abstract

Bedside teaching in clinical education is undoubtedly relevant as it offers organized learning opportunities that enhance knowledge, attitudes, and skills among the learners. Acquisition of procedural skills is an important component of medical education across the spectrum of medical and surgical training. However, teaching procedural skills to beginners is a multifaceted challenge, as it requires the integration of cognitive and motor skills. It is also essential that these skills are retained, enabling today's learners to effectively apply them at patients' bedsides in hospitals or private practice, even many years after they are initially taught. Several well-established methods are used for sequential teaching of bedside procedures. Among those, Peyton's four-step method offers step-wise clinical teaching (for procedural skills) to learners; these four steps are: 1) demonstration; 2) deconstruction; 3) comprehension; and 4) performance and integration. This four-step approach has shown decisive advantages over traditional instruction. This review paper aims to see how and to what extent Peyton's four-step method supports teaching procedural skills to undergraduate medical students as well as postgraduate residents focusing on bedside teaching in the hospital wards.

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Introduction

A significant shift has been observed in recent years in our clinical practices with a growing reliance on advanced laboratory-based tests compared to bedside clinical examination-based diagnostic skills.[1] However, bedside teaching in clinical education is undoubtedly relevant as it offers organized learning opportunities that enhance attitudes, knowledge, and skills among the learners. Bedside teaching during our hospital ward rounds is considered crucial in medical education for effectively demonstrating and observing history taking, physical examination and procedural techniques as well as for exemplifying interpersonal communication, professionalism and compassionate behavior (in the presence of the real patient).[2-4]

Acquisition of procedural skills is a crucial aspect of medical education (encompassing both medical and surgical education and training). These skills range from essential practices like proper handwashing and maintaining sterile techniques to complicated multi-step diagnostic and interventional procedures (e.g., intercostal chest tube drain, fine needle aspiration for cytology, cerebrospinal fluid collection through lumbar

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puncture, partograph, etc.) and surgeries carried out in the operating room.[5,6] However, teaching procedural skills to beginners is a multifaceted challenge, as it requires the integration of cognitive and motor skills.[7-9] It is also essential that these skills are retained, enabling today's learners to effectively apply them at patients' bedsides in hospitals or private practice even many years after they are initially taught.[8] Traditionally, the "see one, do one, teach one" method has been employed for teaching procedures; an instructor demonstrates a procedure, the learner then practices it, and finally, the learner teaches the procedure to other students.[9,10] However, several shortcomings have been identified with this approach, including absence of consensus and insufficient focus on student needs, making it no longer appropriate for procedural skill training.[8] Several well-established methods are used for sequential teaching of bedside procedures. Among those, Peyton's four-step method offers step-wise clinical teaching (for procedural skills) to learners; these four steps are: 1) demonstration; 2) deconstruction; 3) comprehension; and 4) performance and integration.[11] This four-step approach has shown decisive advantages over traditional instruction.[6,12-16]

In a resource-limited country like Bangladesh, medical education is striving for excellence by leveraging internal resources, utilizing free online tools, and benefiting from support from expatriate faculty and technical experts in various foreign institutions and hospitals. Both undergraduate students and postgraduate residents in various clinical specialties at teaching hospitals in Bangladesh are expected to attain competency in procedural skills. This review paper aims to see how and to what extent Peyton's four-step method supports teaching procedural skills to undergraduate medical students as well as postgraduate residents focusing on bedside teaching in the hospital wards. Our expectation behind this effort is to facilitate our faculty members involved in teaching both undergraduate and postgraduate medical education, who guide learners to achieve increased independence and technical proficiency necessary for their future field of practice.

Integration of Peyton's Four-Step Method in Bedside Teaching

As we have mentioned earlier that traditionally, procedures were taught using the "see one, do one, teach one" method, wherein an instructor demonstrates a procedure, and then students practice it;[9,10] we also experienced this form of training when we were medical students. This approach, rooted in Halsted's teachings in the beginning of the 20th century, was designed to transform surgical education and create new training systems for young surgeons in the United States.[9] Modifying our conventional teaching and learning in clinical education, faculty members are now coming forward to apply different well-established theories on the acquisition of clinical skills.[17,18] Here, we consider adoption of Peyton's four-step method and outline how it can be integrated in our bedside teaching in hospital wards (Fig. 1).

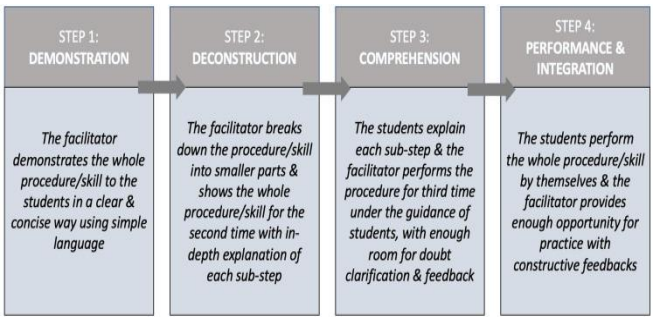

Fig. 1: Peyton's 4-step method in bedside teaching (Modified from Walker & Peyton)[11]

Step 1– Demonstration: The instructor demonstrates a procedure at normal speed without any commentary. Procedural skills range from fundamental healthcare practices such as hand washing and infection control procedure, patient consent, rapport building and communication, and physical examination to specialty/discipline-specific skills like intercostal chest tube drain, cerebrospinal fluid collection through lumbar puncture or partograph training can be demonstrated in bedside teaching.

Step 2 – Deconstruction: The instructor repeats the demonstration of the skill with the description of each step, integrating theory with practice, and encouraging the learners to ask questions and solving problems in understanding each step.

Step 3 – Comprehension: The instructor repeats the demonstration of the skill and the learner describes each step. The instructor provides corrections and feedback. This step can be repeated so that the learners have more than one opportunity to practice the new skill.

Step 4 – Performance and Integration: Then the learner demonstrates the skill, describing each step prior to performing it. The instructor observes the process and provides constructive feedback to the learner. The learners need enough opportunity to practice the skill repeatedly within the time allowed ensuring the safety of the patient, learner, and other staff members involved.

This approach can be used in history taking, physical examination and different procedural techniques as mentioned earlier. However, To reinforce learning, each procedure training session should be followed by a debriefing session.[8]

Discussion

Our views towards the learning of procedural skills is not different from others. We have seen in our teaching experience and support the notion that learning occurs in three phases: i) cognitive (understanding the fundamentals), ii) associative (practice and refinement), and iii) autonomous (mastery and adaptation).[19] Within this model, procedural skills are learned in stages, beginning with a grasp of the specific skill encompassing its overall concept and importance in clinical care, which defines the cognitive phase. The subsequent phase, practice and refinement, focuses on strengthening the skill through deliberate practice and constructive feedback derived from observation. Finally, autonomy is achieved after continued practice in more complex scenarios.[20,21] Stage of the Peyton's method corresponds to those three phases (i.e., cognitive, associative and autonomous) differently during procedural skill acquisition. Besides, this approach also aids in processing information (learning) and applying new knowledge in context (situational awareness).[20,22]

Peyton's four-step process came from teaching in theatre and is now-a-days commonly used in simulation centres and short courses in clinical education.[6] Peyton's Four-Step Approach was designed for teaching in a student-teacher ratio of 1:1; however, need-based modifications can help instructors for small group teaching.[23] We suggest it for our teaching procedural skills at bedside of the patients in the hospital wards (i.e., small group teaching). The method follows a structured process that includes demonstration, breaking down the procedure into smaller steps, comprehension checks where learners explain these steps, and ultimately performing the skill under supervision. It has much similarity with the traditional "see one, teach one, do one" method; however, a strong focus has been given on understanding each component before learners attempt the procedure themselves. Moreover, gaining

procedural skills depends on practice and feedback. In addition to repetition, Peyton's four-step approach enables learners to observe the skill being executed by the instructor in real time, from start to finish, and repeated multiple times prior to their own attempts at the skill.[6,12-16,20,24] This method reinforces learning and provides opportunities to identify and correct errors, along with valuable feedback. Immediate feedback and error correction help prevent the risk of incorrect practice. Thus, it subsequently helps long-term memory and later recalling and performing the skill accurately.[6,8,12-16,21,24] That is why it has become more effective. Moreover, evidence indicates that individuals instructed using Peyton's four-step approach not only perform each procedural step more accurately and with greater professionalism and confidence but also execute the skills more quickly than those trained through traditional methods.[14,15]

Some argued that Peyton's method is best viewed as a cyclical process rather than a linear one, with repeated supervised practice being crucial for developing expertise. Depending on the learner's current knowledge and skills, an instructor can choose to start the cycle at any of the four stages and move between them based on the learner's needs, goals, or concerns.[8,23,25] Furthermore, the complexity of the skill and the time available for practice can affect whether the learning process is episodic or longitudinal.[20,21]

Teaching clinical skills and procedures can be quite challenging. Besides, it often becomes difficult to balance giving learners some freedom while still ensuring quality patient care. Medical teachers have the freedom to customize their lesson plan aligning the Peyton's teaching methods in accordance with their allocated time, learners' needs and hospital environment. For an example, Whitman & Schwenk have offered a valuable adaptation to the traditional "see one, do one, teach one" approach as well as Peyton's method: 1) firstly, instructor demonstrates the skill for the learner to observe, 2) next, supervises closely as the learner practices the skill, 3) then, monitors the learner while he/she performs the skill, trying to minimize interference and 4) finally, supports the learner in performing the skill independently by discussing the procedure beforehand, being available (though not necessarily present) during the execution, and conducting a debrief afterward.[26] However, such progression from one step to the next should be based on the demonstration of competence and ability at each level rather than on a set number of repetitions.[27] Another modification has been suggested by George & Doto, as they added a preceding step – provision of an overview of the relevance of the skill to clinical care before initiating Peyton's process.[28] This framework fully captures the essence of adult learning. Apart from Bedside teaching or face-to-face learning, Peyton's method has also been adopted through modifications in online and blended format of clinical teaching.[29,30]

Peyton's method incorporates several learning theories. The first two steps correspond to the social-cognitive theory of observational learning.[31] The third step is crucial because it requires actively processing the information from the first two steps in working memory to facilitate its transfer to long-term memory.[15,21] The fourth step entails the execution of the procedure, which is associated with behaviorist learning theory.[6,31] Last but not the least, in the dynamic realm of medical education, Peyton's method stands out as a holistic and student-centric approach.[13] In line with the student-centric approach, it is important to take into account of different levels of prior education and experience of the learners, when implementing such instructional strategies aimed at

enhancing skill acquisition.[2,7,8,32]

Overall, evidence suggests that Peyton's four-step process, a well-regarded framework in medical education, can be employed easily and successfully to teach procedural skills even in our low-resource settings.[13,29,30,33] As medical educators, we are expected to provide opportunities for medical students and residents to develop their procedural skills. This requires a careful and nuanced balance between providing support and introducing challenges, fostering autonomy while ensuring supervision, and prioritizing both patient safety and quality clinical care.[5,7]

Conclusion and Recommendations

Among different widely accepted methods of clinical skill acquisition, Peyton's 4-step method is a time-tested one. Integrating this approach into structured clinical training helps us ensure that learners have appropriately acquired their required procedural skills, being methodical and adhered to the step-wise approach, and optimal skill retention in medical and surgical education. In bedside teaching, we can also optimize our lesson plan by aligning this advanced teaching methods with learners' developmental needs. We may push ourselves forward to integrate different effective teaching methods (including Peyton's 4-step method) by revisiting our curriculum in clinical education. Besides, we recommend that medical teachers/instructors involved in bedside teaching will keep the following guidelines in mind when helping learners through the process of acquiring procedural skills in hospital wards (i.e., clinical procedure training):

1) Begin by evaluating the learners' existing knowledge and skills related to the specific procedure.

2) Guide the learner to the appropriate stage or step of the learning cycle.

3) Identify any fears the learners may have and provide the necessary support.

4) Supervise the learning process to ensure the safety of the patient, learner, and other staff members involved.

5) Encourage both individual and group reflections among learners.

6) Offer constructive feedback to learners in a timely manner.

7) However, we also advocate that whenever possible, incorporate simulations to enhance and reinforce skill training (i.e., in the simulation lab where available) to minimize risks to admitted patients and ensure better patient safety.

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