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Enhancing Trauma Care: A Community Service Initiative for Focused Assessment Sonography for Trauma (FAST) Training among Junior Doctors at Dr. H. Abdul Moeloek General Hospital, Bandarlampung, Indonesia

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A B S T R A C T

Focused assessment sonography for trauma (FAST) is a rapid bedside ultrasound examination crucial for the initial assessment of trauma patients. This study reports on a community service initiative aimed at improving FAST competency among young doctors at Dr. H. Abdul Moeloek General Hospital, Bandarlampung, Indonesia. A mixed-methods approach was employed. The program included: 1) A pre-training assessment of FAST knowledge and skills. 2) A structured FAST training curriculum with didactic lectures, hands-on scanning sessions, and case-based discussions. 3) A post-training assessment of FAST competency. 4) Qualitative feedback from participants to assess the program's impact. Thirty-two young doctors participated in the program. There was a significant improvement in FAST knowledge (pre-test mean: 45%; post-test mean: 82%) and scanning skills. Participants reported increased confidence in FAST utilization and its integration into their trauma assessment workflow. This community service initiative demonstrated the effectiveness of a structured FAST training program in enhancing the competency of young doctors in trauma care. Such programs have the potential to improve patient outcomes and contribute to the development of a skilled healthcare workforce.

1. Introduction

Trauma remains a global public health crisis, claiming millions of lives annually and inflicting substantial economic and social burdens. The World Health Organization (WHO) estimates that trauma accounts for over 5 million deaths each year, with a disproportionate impact on low- and middle-income countries (LMICs). In Indonesia, trauma, particularly from road traffic accidents, falls, and violence is a leading cause of mortality and disability, particularly among young adults. The Indonesian Ministry of Health reports that injuries account for over 10% of the total burden of disease in the country. The prompt identification and management of traumatic injuries are crucial for optimizing patient outcomes. Early recognition of life-threatening conditions, such as internal bleeding, is essential for timely intervention and reducing mortality rates. However, in resource-limited settings like Indonesia, access to advanced diagnostic tools like computed tomography (CT) scans may be limited due to cost, availability, and logistical constraints. Therefore, there is a pressing need for portable, accessible, and rapid diagnostic modalities that can be readily deployed in the initial assessment of trauma patients. Focused assessment sonography for trauma (FAST) has emerged as a valuable tool in this regard. FAST is a rapid bedside ultrasound examination that enables the detection of free fluid (indicating internal bleeding or organ injury) within the peritoneal, pericardial, and pleural cavities. It is non-invasive, portable, relatively inexpensive, and can be performed rapidly at the patient's bedside or in the

pre-hospital setting. Several studies have demonstrated the utility of FAST in improving the triage and management of trauma patients, reducing time to diagnosis, and potentially decreasing mortality rates.[1-3]

Despite its proven benefits, the utilization of FAST in LMICs remains suboptimal. Several barriers impede its widespread adoption, including limited access to ultrasound machines, inadequate training of healthcare providers, and a lack of standardized protocols and guidelines. Addressing these barriers requires a multi-faceted approach that includes improving infrastructure, investing in training programs, and developing evidence-based guidelines tailored to the local context. Young doctors, often working in the frontlines of emergency and trauma care, play a pivotal role in the initial assessment and management of trauma patients. Their ability to accurately perform and interpret FAST examinations can significantly impact patient outcomes. However, traditional medical education in Indonesia may not always provide sufficient training in point-of-care ultrasound, including FAST. This can lead to variations in competency levels and potentially missed or delayed diagnoses. Dr. H. Abdul Moeloek General Hospital, located in Bandarlampung, Indonesia, is a major referral center that receives a large number of trauma cases from the surrounding region. The hospital's emergency department is often the first point of contact for patients with traumatic injuries. Recognizing the importance of FAST in improving trauma care, the hospital administration sought to enhance the FAST competency of its young doctors. This initiative was driven by a commitment to providing high-quality, evidence-based care and empowering young doctors to utilize cutting-edge diagnostic tools. The community service project described in this manuscript represents a concerted effort to address the training gap in FAST among young doctors at Dr. H. Abdul Moeloek General Hospital. The project aimed to develop and implement a comprehensive, hands-on training program that would equip participants with the necessary knowledge and skills to confidently perform and interpret FAST examinations in the context of trauma care. The program was designed to be interactive, engaging, and relevant to the real-world challenges faced by young doctors in their daily practice. By focusing on the needs of young doctors, this project aimed to not only improve individual competency but also to foster a culture of continuous learning and quality improvement in trauma care within the hospital. The project also sought to contribute to the broader goal of strengthening emergency and trauma care systems in Indonesia, in line with the national health priorities.[4-7] The study reported in this manuscript evaluates the effectiveness of this community service initiative. By assessing the impact of the training program on knowledge, skills, and confidence, the study seeks to provide valuable insights into the feasibility and impact of such interventions in resource-limited settings.

2. Methods

A mixed-methods, pre-post-intervention study with embedded qualitative components was conducted. This design was chosen to assess both the quantitative impact of the FAST training on participants' knowledge and skills, as well as to gather qualitative feedback on their experiences and perceptions of the program. The study was conducted at Dr. H. Abdul Moeloek General Hospital, a tertiary care hospital in Bandarlampung, Indonesia. All young doctors working in the hospital were eligible to participate. Recruitment was open for a period of two weeks, and participation was voluntary. A total of 40 doctors expressed interest, and 32 (80%) completed the study. The inclusion criteria were young medical doctors at Dr. H. Abdul Moeloek General Hospital. Willingness to participate in all aspects of the training program and assessments, and Ability to provide informed consent. Exclusion criteria were prior formal training in FAST, Unavailability to attend the scheduled training sessions, and refusal to provide informed consent.

The FAST training program was designed based on the latest international guidelines and best practices.

It was delivered over four weeks, with each week focusing on specific aspects of FAST knowledge and skills: Week 1: Didactic Lectures, topics: Introduction to FAST: History, principles, applications in trauma care; Ultrasound Physics: Basic principles of ultrasound generation, propagation, interaction with tissues, and image formation; FAST Anatomy: Review of relevant anatomy of the abdomen, pelvis, thorax, and pericardium; FAST Indications and Contraindications: Appropriate use of FAST in trauma assessment, limitations, and potential risks; Image Acquisition Techniques: Probe positioning, scanning planes, image optimization techniques; Image Interpretation: Normal and abnormal findings, recognition of free fluid, artifacts, and pitfalls. Delivery: Lectures were delivered by experienced radiologists and emergency medicine physicians; Interactive sessions with questions and discussions were encouraged; Handouts and online resources were provided for reference. Week 2: Hands-On Scanning Sessions Methods: High-fidelity simulators with standardized patient models were used; Participants practiced probe positioning, image acquisition, and optimization techniques; Real-time feedback and guidance were provided by instructors; Standard scanning protocols were followed to ensure consistency. Week 3: Case-Based Discussions, Methods: Participants analyzed real trauma cases with diverse presentations; Emphasis on the role of FAST in the initial assessment, triage, and management decisions; Facilitated discussions encouraged participants to share their interpretations and rationale. Week 4: Live Scanning Sessions, Methods: Scanning on healthy volunteers to practice normal anatomy and scanning techniques; Scanning on standardized patients with simulated pathology (e.g., ascites, hemoperitoneum) to detect abnormal findings; Participants were evaluated on their ability to acquire and interpret images accurately.

Assessment tools to rigorously assess the impact of the training program, a comprehensive assessment strategy was employed, utilizing both quantitative and qualitative tools: Quantitative Assessments: Pre- and Post-Training Knowledge Assessment: A validated 25-item multiple-choice questionnaire was developed, covering the following domains: Basic ultrasound physics principles; Relevant anatomy for FAST; Indications and contraindications for FAST; Scanning techniques and probe positioning; Image interpretation (normal and abnormal findings). The questionnaire was administered before the training (pre-test) and immediately after completion (post-test) to assess changes in knowledge acquisition. Pre- and Post-Training Practical Assessment: A standardized checklist was developed to evaluate participants' scanning skills. This checklist included items: Correct probe positioning for each FAST view; Image optimization techniques (depth, gain, focus); Systematic scanning approach; Accurate identification of anatomical landmarks; Correct interpretation of normal and abnormal findings (e.g., presence or absence of free fluid). Each participant was evaluated during a FAST examination on a standardized patient model before and after the training. Two experienced radiologists, blinded to the pre-and post-test status of the participants, independently scored the checklists. Inter-rater reliability was assessed using Cohen's kappa coefficient. Qualitative Assessments: Semi-Structured Interviews: Individual interviews were conducted with a purposive sample of 10 participants (5 high performers, 5 low performers based on post-test scores). The interview guide explored participants' experiences with the training program, perceived changes in their knowledge and skills, challenges encountered, and suggestions for improvement. Interviews were audio-recorded and transcribed verbatim. Focus Group Discussions: Two focus group discussions (6-8 participants each) were conducted to encourage a broader discussion of the training program's strengths and weaknesses. The discussions were facilitated by a trained moderator and focused on themes such as the perceived relevance of the training to clinical practice, its impact on confidence levels, and suggestions for future FAST training initiatives. Discussions were audio-recorded and transcribed verbatim.

Data Analysis: Quantitative Data: Descriptive statistics were used to summarize participants' demographic data (e.g., age, gender, specialty, years of experience); Paired t-tests were used to compare pre- and post-training scores on the knowledge and practical assessments; Effect sizes (Cohen's d) were calculated to quantify the magnitude of the training effect; Inter-rater reliability for the practical assessment was assessed using Cohen's kappa coefficient. Qualitative Data: Thematic analysis was used to analyze the interview and focus group transcripts; Transcripts were independently coded by two researchers using an inductive approach; Codes were then grouped into themes, and a codebook was developed, the final themes were reviewed and discussed by the research team to ensure consensus and validity.

3. Results and Discussion

Table 1 outlines the comprehensive FAST training program implemented as part of the community service project. The program is structured into four distinct components, each with specific objectives, duration, resources, delivery methods, and assessment strategies. Didactic Lectures: This initial phase focused on providing foundational knowledge about FAST. The four-hour session covered the history, principles, and applications of FAST in trauma care, as well as essential concepts in ultrasound physics, relevant anatomy, and image acquisition and interpretation techniques. The use of PowerPoint presentations, handouts, and online resources, coupled with classroom instruction by experienced radiologists and emergency medicine physicians, aimed to deliver content in an engaging and accessible manner. Knowledge acquisition was assessed through a multiple-choice questionnaire. Hands-On Scanning (Simulation): This eight-hour, simulation-based component aimed to familiarize participants with ultrasound equipment and scanning techniques in a safe and controlled environment. Utilizing high-fidelity simulators and standardized patient models allowed for repeated practice of probe positioning, image acquisition, and optimization techniques, with real-time feedback and guidance from instructors. This hands-on approach is critical in developing psychomotor skills and building confidence before transitioning to real patients. Case-Based Discussions: This four-hour component aimed to bridge the gap between theoretical knowledge and clinical practice. Through the analysis of real trauma cases, participants were able to apply their FAST knowledge in diverse scenarios, interpret findings, and discuss the implications for patient management. This interactive format, facilitated by experienced clinicians, promoted critical thinking, problem-solving skills, and clinical decision-making in the context of trauma care. Live Scanning Sessions: The final eight-hour component aimed to consolidate skills and assess proficiency in a more realistic setting. By scanning healthy volunteers and standardized patients with simulated pathology, participants could practice and refine their techniques in a clinical environment. The assessment of image acquisition and interpretation proficiency using a standardized checklist provided a measure of individual competency and identified areas for further improvement.

Table 2 presents a compelling narrative of the effectiveness of the FAST training program in enhancing both theoretical knowledge and practical skills among the participating young doctors. The pre-training knowledge assessment revealed a wide range of scores (16-68%), indicating varying levels of baseline knowledge among participants. However, the post-training assessment showed a remarkable improvement, with all participants scoring above 60% and a significant increase in the mean score (from 45% to 82%, $p < 0.001$). This substantial improvement, supported by a large effect size (Cohen's $d = 2.06$), confirms that the training program effectively enhanced participants' understanding of FAST principles, indications, techniques, and image interpretation. The pre-training practical assessment revealed a common struggle among participants with probe positioning, image optimization, and identification of anatomical landmarks. The post-

training assessment, however, demonstrated a marked improvement in these skills. The significant increase in mean scores (from 3.8 to 8.6, $p < 0.001$) and the large effect size (Cohen's $d = 2.29$) strongly suggest that the hands-on training and simulation sessions were instrumental in building proficiency in FAST scanning and image acquisition. The narrowing of the score range in the post-test (6-10) further indicates a more consistent level of skill mastery among participants after the training. The significant improvements in both knowledge and practical skills, as evidenced by the data in Table 2, underscore the efficacy of the FAST training program. The program successfully addressed the initial knowledge gaps and skill deficits among participants, resulting in a more competent and confident group of young doctors ready to utilize FAST in their clinical practice.

Table 1. Description of the FAST training community service program.

Component	Description	Duration	Materials & resources	Delivery mode	Instructors	Assessment
Didactic lectures	Theoretical instruction on FAST principles, physics, indications, contraindications, anatomy, scanning techniques, and image interpretation.	4 hours (Week 1)	PowerPoint presentations, handouts, online resources, anatomical models	Classroom lectures	Radiologists, EM physicians	Multiple-choice questionnaire
Hands-on scanning (simulation)	Practical training on probe positioning, image acquisition, and optimization using high-fidelity simulators with standardized patient models.	8 hours (Week 2)	High-fidelity ultrasound simulators, standardized patient models	Simulation lab	Radiologists	Standardized checklist
Case-based discussions	Analysis of real trauma cases with a focus on the role of FAST in assessment, triage, and management decisions.	4 hours (Week 3)	Case presentations (PowerPoint), facilitated group discussions, whiteboards/flipcharts	Classroom discussions	Radiologists, EM physicians	Participation, group feedback
Live scanning sessions	Consolidation of scanning skills on healthy volunteers and standardized patients with simulated pathology. Assessment of image acquisition and interpretation proficiency.	8 hours (Week 4)	Ultrasound machine, portable ultrasound machine, healthy volunteers, standardized patients with simulated pathology (ascites, hemoperitoneum), standardized checklist for image acquisition and interpretation	Clinical skills lab, bedside	Radiologists	Standardized checklist

Table 2. Comparison of pre-and post-training assessment scores.

Assessment	Pre-training	Post-training	Mean difference	p-value	Effect size (Cohen's d)
Knowledge assessment (25-item MCQ)	Mean: 45% (SD = 18)	Mean: 82% (SD = 12)	37%	<0.001	2.06
	Range: 16-68%	Range: 60-96%			
Practical assessment (Standardized Checklist)	Mean: 3.8 (SD = 2.1)	Mean: 8.6 (SD = 1.3)	4.8	<0.001	2.29
	Range: 1-7	Range: 6-10			

Table 3 provides a comprehensive overview of the qualitative feedback gathered from participants regarding the FAST training program. Participants valued the practical nature of the training, particularly the use of simulators and live scanning sessions. This hands-on approach allowed them to develop muscle memory, refine their techniques, and gain confidence in their abilities. The opportunity to practice on real patients was seen as particularly valuable, as it allowed them to apply their knowledge in a realistic setting. The training environment was characterized by constructive feedback, collaboration, and a positive atmosphere. Participants appreciated the instructors' supportive approach, which encouraged them to ask questions, share ideas, and learn from each other. This fostered a sense of camaraderie and shared learning, further enhancing the overall experience. Participants reported that the training had a significant impact on their clinical practice. They felt more confident in their ability to utilize FAST in trauma assessment, leading to improved decision-making and a greater sense of preparedness to manage trauma patients. This suggests that the training program not only enhanced individual skills but also had a broader impact on the quality of care provided at the hospital. The training was perceived as highly valuable by participants, who saw it as contributing to both their personal and professional development. They recognized the importance of FAST in improving patient care and expressed a desire for ongoing education and skill maintenance to ensure continued competency. While the feedback was largely positive, participants also offered valuable suggestions for improvement. These included requests for more hands-on practice, particularly on live patients, as well as a desire to learn about advanced FAST applications beyond trauma. Some participants also suggested integrating FAST training into the residency curriculum to ensure that all young doctors receive this essential skill training. Table 3 paints a picture of a successful training program that effectively engaged participants, enhanced their skills and confidence, and positively impacted their clinical practice. The qualitative feedback provides valuable insights into the strengths of the program and areas for further development. It also reinforces the importance of investing in hands-on, simulation-based training programs that foster a supportive learning environment and emphasize real-world relevance to optimize the learning experience and translate knowledge into practice.

Table 3. Themes from qualitative feedback.

Theme	Subtheme	Illustrative quotes
Hands-on learning experience	Value of Simulation	"The simulator was really helpful in getting a feel for the probe and how to move it."
	Real-World Relevance	"The case studies made FAST feel much more applicable to what we see in the ER."
	Improved Confidence	"I feel much more confident now that I've had a chance to practice on real patients."
Supportive learning environment	Constructive Feedback	"The instructors were great at giving feedback in a way that was helpful, not critical."
	Collaborative Atmosphere	"It was nice to learn alongside my colleagues and bounce ideas off each other."
Impact on practice	Increased Awareness of FAST Applications	"I'm more aware now of when FAST is indicated and how it can guide our decision-making."
	Enhanced Clinical Decision-Making	"I feel more equipped to quickly assess trauma patients and make decisions about their care."
Perceived value of training	Improved Patient Care	"I think this training will definitely make a difference in how we care for trauma patients."
	Professional Development	"This was a valuable learning experience, and I'm excited to use these skills in my practice."
Suggestions for improvement	More Hands-On Practice	"It would be great to have even more time on the simulators or with standardized patients."
	Advanced FAST Applications	"I'd be interested in learning more about how FAST can be used for other conditions besides trauma."
	Integration into Residency Curriculum	"I think this type of training should be mandatory for all residents, regardless of their specialty."
	Continuing Education and Skill Maintenance	"I hope there will be opportunities for refresher courses or ongoing skill assessments to keep us sharp."

Social cognitive theory (SCT), pioneered by Albert Bandura, provides a robust framework for understanding human behavior and learning processes. It posits that learning occurs through the dynamic interplay of personal factors (e.g., knowledge, beliefs, self-efficacy), environmental factors (e.g., social support, resources, opportunities), and behavioral factors (e.g., skills, practice, outcomes). This reciprocal determinism emphasizes that these factors continuously influence and shape each other. The didactic lectures provided participants with the foundational knowledge necessary to understand FAST principles, anatomy, indications, and interpretation. This knowledge served as a building block for developing the cognitive skills required for effective FAST scanning. Self-efficacy, the belief in one's ability to succeed, is a critical determinant of behavior change. The hands-on simulation and live scanning sessions allowed participants to experience success in a safe and supportive environment, boosting their confidence and self-efficacy in performing FAST examinations. The positive feedback and encouragement from instructors further reinforced these beliefs. The collaborative learning environment fostered by the training program created a supportive network where participants could learn from each other, share experiences, and receive constructive feedback. This social support not only enhanced learning but also created a sense of community and shared purpose, motivating participants to excel. The provision of high-fidelity simulators, standardized patient models, ultrasound machines, and other resources created an optimal learning environment. This ensured that participants had access to the tools and opportunities needed to practice and refine their skills under the guidance of experienced instructors. The hands-on simulation and live scanning sessions allowed participants to repeatedly practice and refine their FAST scanning techniques. This active learning approach, combined

with immediate feedback, accelerated skill acquisition and improved performance. The case-based discussions and live scanning sessions provided opportunities for participants to apply their knowledge and skills in real-world scenarios. This practice reinforced learning and facilitated the transfer of skills to the clinical setting. The positive outcomes (e.g., accurate image acquisition, correct interpretation) experienced by participants during the training further strengthened their self-efficacy and motivation. The constructive feedback provided by instructors helped identify areas for improvement and guided participants toward mastery of the skills.[8-10]

The interplay of personal, environmental, and behavioral factors was evident throughout the FAST training program. For example, the initial didactic lectures increased participants' knowledge, which in turn influenced their self-efficacy and motivation to learn. As they gained hands-on experience and received positive feedback, their confidence grew, leading to further skill development. This virtuous cycle of reciprocal determinism ultimately resulted in significant improvements in both knowledge and practical skills. In addition to the core components of SCT, observational learning played a crucial role in the training program. Participants had the opportunity to observe experienced radiologists and emergency medicine physicians perform FAST examinations, model effective scanning techniques, and interpret images. This observational learning, coupled with guided practice and feedback, accelerated skill acquisition and promoted a deeper understanding of FAST principles. The presence of skilled role models not only facilitated learning but also influenced participants' motivation and self-efficacy. Observing peers and instructors successfully perform FAST examinations inspired participants to strive for similar levels of competence. This social modeling effect is a powerful motivator for behavior change, as it demonstrates the feasibility and attainability of desired outcomes. The impact of the FAST training program is likely to extend beyond the immediate post-training assessment results. The enhanced self-efficacy and positive learning experiences are likely to foster a continued interest in FAST and a commitment to lifelong learning. The success of the FAST training program underscores the power of Social Cognitive Theory in guiding the design and implementation of effective educational interventions. By understanding and leveraging the reciprocal interaction of personal, environmental, and behavioral factors, educators can create learning experiences that promote knowledge acquisition, skill development, and behavior change.[11-13]

Experiential learning theory (ELT), pioneered by David Kolb, is a holistic approach to education that emphasizes the pivotal role of experience in the learning process. It posits that learning is not merely the passive absorption of information but rather an active process of constructing knowledge through concrete experiences, reflective observation, abstract conceptualization, and active experimentation. This initial stage involves engaging in a new experience or re-interpreting an existing one. In the context of the FAST training program, this could be the hands-on experience of manipulating an ultrasound probe on a simulator or a real patient. Reflective Observation (RO): In this stage, learners reflect on their experiences, considering different perspectives and analyzing their observations. In the FAST training, this could involve reviewing recorded ultrasound images, discussing observations with peers and instructors, or journaling about the experience. Abstract Conceptualization (AC): This stage involves forming new ideas or modifying existing ones based on the reflections from the previous stage. Learners might connect their hands-on experience with the theoretical knowledge acquired during didactic lectures, developing a deeper understanding of FAST principles and techniques. Active Experimentation (AE): This final stage involves applying the newly formed concepts to real-world situations, testing their validity, and receiving feedback. In the FAST training, this could be performing a FAST examination on a new patient, incorporating feedback from instructors, and refining their skills in a clinical setting.[14-16]

Reflection is a critical component of the ELT cycle. It allows learners to make sense of their experiences, identify areas for improvement, and develop new strategies for future encounters. In the FAST training program, reflection was facilitated through various mechanisms: After each hands-on session, participants engaged in debriefing sessions led by instructors. These sessions provided a structured forum to discuss observations, challenges, and successes; Analyzing real-life trauma cases encouraged participants to reflect on how FAST could be applied in diverse situations and how it could influence decision-making; Interactions with colleagues during live scanning sessions and discussions provided opportunities for peer-to-peer learning and feedback; Participants were encouraged to self-assess their performance using the standardized checklist, identifying areas where they could improve. The FAST training program was intentionally designed to align with the principles of ELT. Hands-on scanning sessions on simulators and real patients provided participants with direct, tangible experiences with FAST. Debriefing sessions, case-based discussions, peer feedback, and self-assessment encouraged reflection on performance and learning outcomes. Didactic lectures and discussions provided the theoretical framework for understanding the practical experiences, allowing participants to connect theory and practice. Live scanning sessions provided opportunities to test newly acquired knowledge and skills in a clinical setting, receiving feedback and refining their approach. The integration of ELT into the FAST training program had a profound impact on the learning outcomes. The combination of hands-on experience, reflection, and theoretical knowledge facilitated deeper understanding, enhanced skill retention, and improved clinical decision-making. This was evident in the significant improvements observed in both the knowledge and practical assessments. Furthermore, the qualitative feedback from participants indicated that the ELT approach fostered a sense of engagement, motivation, and relevance. Participants valued the opportunity to apply their knowledge in real-world scenarios and felt empowered to take ownership of their learning. This positive learning experience is likely to translate into long-term benefits in their clinical practice. The success of the FAST training program exemplifies the broader applicability of ELT in medical education. In an era where healthcare is becoming increasingly complex and technology-driven, traditional lecture-based learning is no longer sufficient. Experiential learning offers a more dynamic and effective approach to teaching and learning, one that prepares healthcare providers for the challenges of modern practice. By actively engaging learners in the learning process, facilitating reflection, and promoting the integration of theory and practice, ELT has the potential to transform medical education and ultimately improve patient care.[17-19]

Adult learning theory (ALT), also known as andragogy, serves as a foundational framework for understanding how adults learn most effectively. It recognizes that adults differ significantly from children and adolescents in their learning styles, motivations, and experiences. The FAST training program at Dr. H. Abdul Moeloek General Hospital, intentionally incorporated key principles of ALT to create a learner-centered environment that maximized engagement and knowledge acquisition. As individuals mature, their self-concept evolves from dependency to self-direction. Adults prefer to be treated as autonomous learners who can take responsibility for their own learning. Adults bring a vast reservoir of experience to the learning environment. This experience serves as a rich resource for learning, but it can also create biases and assumptions that need to be acknowledged. Adults are most motivated to learn when they perceive the knowledge or skills as relevant to their current life situation or professional goals. Adults are problem-centered and task-oriented learners. They prefer learning that is immediately applicable to real-world challenges. Adults are motivated by both internal factors (personal satisfaction, self-esteem) and external factors (job advancement, recognition). Participants were encouraged to take ownership of

their learning by setting individual goals, identifying areas for improvement, and actively participating in discussions and activities. The program offered flexibility in terms of pacing and learning styles, allowing participants to progress at their own pace and choose the methods that best suited their preferences. The program acknowledged the diverse experiences of the participants, many of whom were already practicing physicians. Case-based discussions and live scanning sessions provided opportunities for participants to share their clinical experiences, draw on their prior knowledge, and relate the newly acquired FAST skills to real-world scenarios. This approach fostered a sense of relevance and enhanced the transfer of learning to practice. The training program emphasized the practical applications of FAST in trauma assessment. By highlighting the immediate relevance of the skills to their daily practice, participants were more motivated to learn and engage with the material. The instructors also created a supportive and encouraging learning environment, which further enhanced participants' readiness to learn. The program focused on solving real-world problems rather than simply imparting theoretical knowledge. Case-based discussions, simulation exercises, and live scanning sessions provided opportunities for participants to apply their knowledge in a practical context. This problem-centered approach not only made the learning more engaging but also ensured that the skills acquired were directly transferable to the clinical setting. The program appealed to both intrinsic and extrinsic motivators. The opportunity to enhance their skills, improve patient care, and gain recognition within their profession provided strong intrinsic motivation for participants. Additionally, the program offered continuing medical education (CME) credits, which served as an external motivator for professional development.[16-18]

The integration of ALT principles into the FAST training program had a profound impact on learning outcomes. By fostering a learner-centered environment that emphasized self-direction, relevance, and practical application, the program created a highly engaging and effective learning experience. The qualitative feedback from participants further validated the effectiveness of this approach. Many participants expressed appreciation for the opportunity to take ownership of their learning and tailor the program to their individual needs. They also valued the emphasis on real-world scenarios and the ability to apply their knowledge in a clinical setting. The quantitative assessment results further confirmed the positive impact of the ALT-based approach. The significant improvement in both theoretical knowledge and practical skills demonstrates that the program successfully achieved its learning objectives. Moreover, the high level of engagement and motivation reported by participants suggests that the program fostered a positive learning experience that is likely to have a lasting impact on their professional practice. The successful integration of adult learning theory into the FAST training program exemplifies how a learner-centered approach can enhance the effectiveness of medical education. By recognizing the unique characteristics of adult learners and tailoring the program to their needs, the facilitators were able to create a highly engaging and impactful learning experience. The results of this study highlight the importance of incorporating ALT principles into medical education initiatives to optimize learning outcomes and ultimately improve patient care.[17,18]

Situated learning theory (SLT), pioneered by Jean Lave and Etienne Wenger, offers a compelling framework for understanding how individuals acquire complex skills in real-world contexts. SLT posits that learning is not merely an internal, cognitive process but rather a social and participatory activity deeply embedded in specific situations and communities of practice. The theory emphasizes the importance of learning in authentic contexts, where learners engage in activities that are relevant and meaningful to their future practice. SLT views learning as a process of active participation in a community of practice. Learners are not passive recipients of knowledge but active contributors who engage in meaningful

activities alongside more experienced members. This participatory process allows learners to gradually develop expertise through legitimate peripheral participation, starting with simple tasks and progressing to more complex ones as their skills and knowledge increase. Legitimate Peripheral Participation (LPP): LPP is a core concept in SLT. It describes the process by which newcomers enter a community of practice and gradually become full participants. Initially, learners participate on the periphery, observing and assisting more experienced members. As they gain experience and knowledge, their participation becomes more central and their contributions more valuable. Communities of Practice (CoPs): CoPs are groups of people who share a common interest or passion and learn how to do things better as they interact regularly. In the context of healthcare, CoPs can be formed around specific clinical areas, such as trauma care, where healthcare providers share knowledge, skills, and experiences to improve patient outcomes. Authentic Context: SLT emphasizes the importance of learning in authentic contexts, where learners can apply their knowledge and skills to real-world problems. This contrasts with traditional classroom learning, which often focuses on abstract concepts and decontextualized information. The program emphasized hands-on learning through simulation-based training and live scanning sessions. This allowed participants to actively engage in the learning process and practice their skills in a realistic setting. By mimicking the challenges and complexities of real-world FAST examinations, the training program facilitated the transfer of knowledge and skills to clinical practice. The training program created a temporary community of practice where participants could interact with each other, share experiences, and learn from more experienced instructors. The collaborative learning environment fostered a sense of belonging and encouraged participants to ask questions, seek feedback, and learn from their mistakes. The program structure allowed for gradual skill development through LPP. Participants started with basic scanning techniques on simulators and gradually progressed to more complex scenarios on standardized patients. This incremental approach provided a safe and supportive environment for learners to develop their skills at their own pace. The use of case-based discussions and live scanning sessions provided participants with opportunities to apply their knowledge in authentic contexts. By analyzing real trauma cases and practicing on real patients, participants were able to bridge the gap between theory and practice, enhancing their ability to utilize FAST in the emergency department. The integration of SLT principles into the FAST training program had a profound impact on learning outcomes. Participants demonstrated significant improvements in both theoretical knowledge and practical skills, as evidenced by the quantitative assessment results. The qualitative feedback further highlighted the value of the hands-on, contextualized learning approach, with participants reporting increased confidence, improved decision-making skills, and a greater appreciation for the role of FAST in trauma care. The success of the program can be attributed, in part, to the alignment of the training methods with the principles of SLT. By creating a learning environment that fostered active participation, collaboration, and real-world relevance, the program facilitated deeper understanding, skill development, and knowledge transfer.[18-20]

4. Conclusion

This community service project demonstrated the feasibility and effectiveness of a structured FAST training program in enhancing the competency of young doctors at Dr. H. Abdul Moeloek General Hospital. The project's success highlights the importance of investing in the education and training of healthcare providers, particularly in resource-limited settings, to improve trauma care and ultimately save lives.

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