RESEARCH PAPER

The Al-Mulhim–Alwadaani–Sabri Three-Teacher Model: A Structured Collaborative Framework for Revitalising Clinical Bedside Teaching in Undergraduate Medical Education

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ABSTRACT

Background: Clinical bedside teaching (CBT) has historically constituted the foundational pedagogy of undergraduate medical education, enabling the concurrent development of clinical reasoning, physical examination proficiency, communication skills, and professional identity. Over the past two decades, however, CBT has undergone a documented and progressive decline in prevalence and quality across global medical institutions, driven by technological substitution, curricular overcrowding, increased patient throughput, workforce pressures, and—most acutely—the disruptions imposed by the COVID-19 pandemic. This erosion threatens the production of clinically competent graduates equipped to meet contemporary healthcare demands.

Objectives: This paper presents the conceptual development, structural architecture, and operational rationale of the Al-Mulhim–Alwadaani–Sabri (AAS) Three-Teacher Model—a novel, structured, collaborative framework for delivering high-quality CBT within a single teaching session. The paper additionally reviews the evidence base underpinning CBT, characterises the multi-dimensional factors contributing to its decline, evaluates existing pedagogical responses, and positions the AAS model as an actionable institutional solution.

Methods: A narrative review of published literature on CBT, clinical medical education, and pedagogical models was conducted using PubMed, ERIC, and Web of Science (2000–2024). A model development methodology was employed, drawing on educational theory (constructivism, deliberate practice, and experiential learning), expert faculty experience, and iterative feedback from student cohorts at King Faisal University College of Medicine, Al-Ahsa, Saudi Arabia.

Results: The AAS Three-Teacher Model operationalises a four-phase iterative structure—Preplanning, Planning, Preparation, and Execution—coordinating the complementary expertise of a clinical teacher, a basic science faculty member, and a medical educationist to design and deliver a scripted, learner-centred bedside encounter. Preliminary observations indicate that the model facilitates integration of clinical and foundational science, promotes deliberate learning objective alignment, and generates structured student feedback loops that enable session-to-session quality improvement.

Conclusion: The AAS Three-Teacher Model offers a replicable, evidence-informed framework to counter the decline of CBT in institutional medical education. By aligning clinical relevance, scientific foundation, and pedagogical rigour within a single collaborative structure, it addresses the primary barriers to effective bedside teaching and holds promise as a scalable model for undergraduate and postgraduate medical programmes internationally.

Keywords: Clinical bedside teaching; Medical education; Three-teacher model; Collaborative teaching; Clinical skills; Constructivist pedagogy; Deliberate practice; Undergraduate medical education; Interprofessional education

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INTRODUCTION

Clinical bedside teaching (CBT)—defined as the direct, supervised interaction between a clinical educator, one or more medical students, and an actual patient in a clinical setting—represents perhaps the most enduring and distinctive pedagogical tradition in the history of medical education [1,2]. Traced to the reforms of Hermann Boerhaave at the University of Leiden in the early eighteenth century and systematised in the Oslerian tradition of North American medical schools in the late nineteenth and early twentieth centuries, CBT has long been regarded as the irreplaceable crucible in which theoretical medical knowledge is forged into practical clinical competence [3,4].

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The rationale for CBT is not merely historical or sentimental. A robust body of evidence documents that bedside teaching uniquely integrates multiple domains of clinical learning: students acquire history-taking and physical examination skills, develop diagnostic reasoning through immediate patient-data feedback, internalise professional behaviours through role modelling, cultivate therapeutic empathy through direct patient contact, and begin to construct the clinical identity that will define their professional practice [5,6]. These outcomes are poorly replicated by lecture-based instruction, case-based scenarios, or even high-fidelity simulation—each of which addresses important educational goals but lacks the authenticity, unpredictability, and human complexity of the actual patient encounter [7].

Despite this established pedagogical value, a substantial and convergent body of literature from multiple countries and healthcare systems documents a marked decline in both the frequency and quality of CBT in undergraduate medical education [8,9,10]. Studies conducted in the United Kingdom, the United States, Canada, Australia, and across South Asian and African medical schools have consistently identified that medical students spend significantly less time at the bedside than their counterparts in previous generations, and that the time they do spend is frequently poorly structured, inadequately supervised, and minimally aligned with explicit learning outcomes [11,12,13].

The drivers of this decline are multi-dimensional, encompassing technological displacement, curricular inflation, institutional efficiency pressures, inadequate faculty preparation for teaching roles, ethical barriers to patient participation in teaching, and—since 2020—the profound disruptions imposed by the COVID-19 pandemic [14,15,16]. Addressing this decline requires more than exhortation; it demands the development and evaluation of structured pedagogical models that make CBT operationally feasible, educationally rigorous, and institutionally sustainable.

This paper introduces the Al-Mulhim–Alwadaani–Sabri (AAS) Three-Teacher Model, developed at King Faisal University College of Medicine, as a structured, collaborative framework designed to revitalise and systematise CBT within the constraints of a single teaching session. The model coordinates the expertise of three distinct academic roles—the clinical teacher, the basic science educator, and the medical educationist—in a phased process that encompasses preplanning, planning, preparation, and execution, with embedded feedback mechanisms that enable iterative quality improvement. The paper contextualises this model within the existing evidence base, characterises its theoretical underpinnings, and describes its operational architecture in sufficient detail to facilitate adoption and further evaluation.

THE EVIDENCE BASE FOR CLINICAL BEDSIDE TEACHING

Educational Value and Learning Outcomes

The educational superiority of CBT for the development of clinical competence rests on several converging theoretical and empirical foundations. Experiential learning theory, as articulated by Kolb [17], posits that durable learning is achieved through the cyclical integration of concrete experience, reflective observation, abstract conceptualisation, and active experimentation—a cycle that the bedside encounter uniquely activates in its full form. The patient is simultaneously a source of experiential data, a prompt for reflection, a test of theoretical understanding, and an opportunity for the application of clinical judgement.

Deliberate practice theory, developed by Ericsson and colleagues [18], further supports the primacy of structured, supervised, feedback-rich clinical encounters for the acquisition of expert performance. The bedside setting provides the authentic task conditions, the immediate corrective feedback from experienced clinicians, and the graduated challenge structure that deliberate practice requires. Simulation, while valuable for pre-clinical skill acquisition, cannot fully replicate the adaptive complexity of real patient encounters that drives expert development [19].

Empirically, studies using structured assessments of clinical competency have demonstrated that students who receive higher volumes of CBT achieve superior performance on clinical skills examinations, objective structured clinical examinations (OSCEs), and clinical clerkship assessments compared to peers whose clinical training relies more heavily on simulated or didactic modalities [20,21]. A landmark study by Elnicki and colleagues [22] demonstrated that the quality—not merely the quantity—of supervisory interactions during bedside encounters was the strongest predictor of student clinical skill development, underscoring the importance of structured, intentional CBT design.

The Global Decline of Bedside Teaching: Scope and Evidence

The decline of CBT has been documented with notable consistency across international contexts. LaCombe [23] reported, as early as 1997, that physical examination was being performed less rigorously and less frequently in American teaching hospitals, attributing this to the dominant culture of technology-dependent diagnosis. Subsequent surveys by Ramani [24] and Nair and colleagues [9] confirmed that faculty

dedicated less than 25% of clinical teaching time to the bedside, with the remainder occupied by corridor presentations, conference room case discussions, and administrative obligations.

In the African context, Odekunle and colleagues [13] highlighted the particularly acute impact of the bedside teaching decline on medical institutions in sub-Saharan Africa, where diagnostic technology access is limited and physical examination proficiency is therefore even more critical to clinical practice. Their analysis identified that African medical schools face a compound disadvantage: they import pedagogical models from high-income countries that are increasingly technology-dependent, while operating in environments where that technology is unavailable—producing graduates ill-equipped for both contexts.

Within Saudi Arabia and the broader Gulf Cooperation Council (GCC) region, rapid expansion of medical education capacity—with several new medical colleges established in the past two decades—has created large student cohorts whose clinical exposure is frequently diluted across insufficient clinical training sites, compounding the national challenge of CBT delivery [25].

Consequences of Decline: Clinical Skills and Professional Identity

The erosion of CBT carries documented consequences for graduate clinical competence. Muhammad and colleagues [8] identified a systematic deterioration in the physical examination skills of newly qualified physicians, with studies from multiple countries reporting that medical graduates are unable to detect common auscultatory findings, perform reliable neurological examinations, or accurately interpret clinical signs that were considered basic competencies in previous generations. This skills deficit has direct patient safety implications, as clinical misdiagnosis attributable to inadequate physical examination remains a leading category of diagnostic error in healthcare systems globally [26].

Beyond technical skill, CBT is a primary vehicle for the transmission of professional identity and medical culture. Role modelling—widely recognised as among the most powerful mechanisms of professional socialisation in medicine—operates through the direct observation of senior clinicians demonstrating clinical reasoning, patient communication, and ethical conduct at the bedside [27]. The diminution of CBT therefore represents not only a deficit in skill training but a rupture in the intergenerational transmission of professional values that is difficult to replicate through formal curriculum delivery.

FACTORS CONTRIBUTING TO THE DECLINE OF CLINICAL BEDSIDE TEACHING

Technological Displacement

The proliferation of advanced diagnostic imaging, laboratory automation, and point-of-care testing has fundamentally altered the diagnostic workflow in clinical medicine, with consequences for the educational emphasis placed on physical examination and clinical reasoning. When the diagnosis of pulmonary embolism is established by CT pulmonary angiography within minutes of clinical suspicion, the diagnostic value attributed to physical examination findings—tachycardia, pleural friction rub, signs of deep venous thrombosis—is perceived as diminished, and the educational emphasis on their detection follows the same trajectory [28].

The integration of simulation technologies and digital learning platforms into medical curricula, while genuinely valuable for pre-clinical skill acquisition and formative assessment, has in some institutional contexts displaced rather than supplemented CBT, particularly where resource constraints force an either/or curricular trade-off [1]. Virtual patient encounters, while offering scalability and standardisation, lack the affective and interpersonal dimensions of real patient contact that are educationally irreplaceable [29].

Curricular Inflation and Structural Constraints

The expansion of the medical knowledge base has created intense competition for curriculum time, with the consequence that clinical skills training—including CBT—has been progressively compressed in favour of biomedical science content delivery [30]. Problem-based and case-based learning formats, which dominate curricula design in many contemporary medical schools, prioritise cognitive knowledge acquisition and self-directed learning skills but provide limited structured opportunity for supervised patient contact [31].

Structural constraints in clinical settings compound this curricular pressure. Reduced patient length of stay, driven by both clinical advances and healthcare efficiency mandates, limits the window for repeated student contact with individual patients and reduces the diversity of clinical presentations available for teaching [9,32]. High patient throughput creates time pressure on clinical supervisors for whom teaching must compete with service delivery obligations that are unambiguously prioritised by institutional performance metrics.

Faculty Engagement and Role Ambiguity

Gimson and colleagues [5] identified a fundamental governance problem in CBT: it is "everybody's but nobody's responsibility." In the absence of clear role assignments, accountability structures, and institutional incentives for teaching performance, individual faculty members may de-prioritise CBT in favour of activities that are more formally recognised and rewarded—research output, clinical service delivery, and administrative leadership [33].

Faculty preparation for clinical teaching roles is frequently inadequate. Many clinical educators have received no formal training in pedagogical principles, learning objective formulation, or feedback delivery, and must rely on intuitive or imitative approaches derived from their own educational experiences—which may themselves reflect the declining CBT culture they are expected to reverse [34]. This preparation deficit is particularly relevant for junior clinical staff who bear a disproportionate share of day-to-day teaching responsibilities in hospital settings.

Patient-Related and Ethical Factors

Ethical considerations surrounding patient consent, dignity, and autonomy in teaching contexts have become increasingly prominent, reflecting broader societal changes in the conceptualisation of the patient role in healthcare [35]. Patients in contemporary clinical environments are more informed, more assertive of their rights, and more likely to decline participation in teaching encounters than their historical counterparts—a development that, while reflecting welcome social progress, creates practical constraints on CBT delivery that must be proactively managed rather than circumvented [36].

The COVID-19 Pandemic as Accelerant

The COVID-19 pandemic imposed an abrupt and severe disruption on CBT globally, as infection control requirements eliminated or drastically curtailed direct patient contact for medical students at precisely the period of their training designated for intensive clinical exposure [15]. Van Dam and colleagues [16] characterised the pandemic as having "accelerated existing trends" rather than creating new ones, arguing that the rapid pivot to remote and hybrid learning exposed—and further entrenched—institutional dependence on non-bedside teaching modalities.

The long-term educational consequences of pandemic-era clinical training gaps remain under investigation, but preliminary evidence from multiple countries suggests that cohorts whose clinical training was substantially disrupted by COVID-19 restrictions show measurable deficits in physical examination skills, clinical confidence, and patient communication competency compared to pre-pandemic cohorts [37].

THE AL-MULHIM–ALWADAANI–SABRI (AAS) THREE-TEACHER MODEL

Conceptual Foundations

The AAS Three-Teacher Model was developed in response to a critical observation: the most commonly cited barriers to effective CBT—lack of curricular alignment, disconnection between clinical and foundational science, inadequate teaching preparation, and absence of structured feedback—are not individually intractable but collectively require a coordinated, multi-role response that no single clinician educator can optimally provide. The model draws its conceptual architecture from three established theoretical frameworks.

First, constructivist learning theory, as developed by Vygotsky [38] and elaborated in medical education by Bleakley [39], holds that meaningful clinical learning occurs when new information is integrated into existing cognitive schemas through guided social interaction. The AAS model instantiates this principle by explicitly coordinating the integration of clinical context (provided by the surgeon/clinician) and foundational science knowledge (provided by the basic science faculty member), ensuring that students construct coherent, integrated mental models of disease rather than accumulating disconnected factual modules.

Second, the scholarship of teaching and learning (SoTL) framework, operationalised through the involvement of the medical educationist, ensures that the pedagogical design of each session reflects current evidence on effective clinical teaching—including the use of explicit learning objectives, appropriate questioning strategies, deliberate feedback structures, and assessment alignment [40].

Third, quality improvement (QI) methodology—specifically the Plan-Do-Study-Act (PDSA) cycle—informs the model's iterative structure, with each teaching session constituting a single QI cycle whose outcomes (student feedback) directly inform the design of subsequent sessions [41]. This embedding of continuous improvement within the model architecture addresses the absence of quality feedback loops that commonly characterises informal CBT in clinical settings.

Model Architecture: Roles and Responsibilities

The AAS model coordinates three distinct educator roles, each contributing a non-overlapping domain of expertise to the collective teaching endeavour:

Role	Designee	Domain of Contribution
Teacher 1	Clinical Specialist (e.g., Surgeon, Physician)	Clinical context, patient case selection, history and examination findings, management decisions, current practice standards
Teacher 2	Basic/Biomedical Science Faculty (e.g., Anatomist, Pathologist, Physiologist)	Foundational science integration — anatomy, pathophysiology, pharmacology, microbiology underpinning the clinical scenario
Teacher 3	Medical Educationist / Clinical Education Specialist	Learning objective formulation, teaching methodology selection, session scripting, feedback design, and educational quality assurance

Table 1. Roles and domains of contribution within the AAS Three-Teacher Model.

Model Phases: Operational Description

Phase 0: Preplanning — Upstream Feedback Integration

Before the planning process for a given cohort begins, formative feedback is systematically collected from the senior student cohort immediately above the target group—that is, students who have recently completed the clinical experience for which the session is being designed. This upstream feedback approach, analogous to the use of alumni surveys in programme evaluation, provides practical intelligence on the learning gaps, conceptual misconceptions, and pedagogical preferences of learners similar to those who will participate in the forthcoming session [42]. For example, when designing a bedside teaching session for fourth-year students, the model requires structured feedback collection from fifth-year students who experienced the equivalent session in the preceding academic year.

The preplanning phase data are synthesised by the medical educationist into a structured brief that is shared with Teachers 1 and 2 before the Planning Phase, ensuring that session design is responsive to demonstrated learner needs rather than solely determined by teacher preference or disciplinary custom.

Phase 1: Planning — Clinical–Foundational Science Integration

In the Planning Phase, Teachers 1 and 2 convene—with facilitation by the medical educationist—to align clinical learning objectives with foundational science learning objectives for the selected patient case or clinical scenario. This collaboration is the conceptual centrepiece of the AAS model, operationalising the principle of vertical integration between basic and clinical sciences that has been identified as a major deficiency in traditional compartmentalised medical curricula [43,44].

As an illustrative example: when the clinical teacher (a surgeon) selects a patient with cholelithiasis as the teaching case, the Planning Phase results in an agreed objective structure in which the surgeon's clinical contributions (symptomatology, ultrasound interpretation, indications for cholecystectomy, post-operative care) are explicitly paired with the anatomist's and pathologist's contributions (biliary anatomy, bile composition and gallstone formation, histopathological changes in chronic cholecystitis, laparoscopic anatomical landmarks). The result is a unified learning objective map that ensures students encounter the case as an integrated clinical-scientific narrative rather than a sequential series of disconnected disciplinary presentations.

Phase 2: Preparation — Pedagogical Design and Session Scripting

In the Preparation Phase, all three teachers convene to translate the agreed learning objective map into a structured session script—a sequenced pedagogical plan specifying the order of content delivery, the teaching methods to be employed (questioning, demonstration, directed observation, guided examination), the materials required, the time allocation for each segment, and the assessment/feedback instruments to be used.

The medical educationist takes primary responsibility for this phase, drawing on their expertise in clinical teaching methodology to select strategies appropriate to the learning objectives, the patient context, and the student cohort. Evidence-supported bedside teaching strategies—including the One Minute Preceptor model [45], Socratic questioning, and the SNAPPS framework (Summarise, Narrow, Analyse, Probe, Plan, Select) [46]—may be incorporated into the script as appropriate. The script is not intended as a rigid protocol but as a pedagogical roadmap; Teachers 1 and 2 are encouraged to exercise clinical and academic judgement in its execution. A session is evaluated as having achieved script adherence if more than 80% of the planned elements are addressed, providing a measurable quality benchmark.

Phase 3: Execution — Bedside Teaching Encounter and Feedback

The Execution Phase constitutes the actual CBT session, led primarily by Teacher 1 (the clinical educator) at the patient's bedside or in the clinical environment. The clinical teacher guides students through history-taking, clinical examination, and case reasoning, following the prepared script while remaining responsive to the unpredictable nature of clinical encounters and the immediate learning needs of students. Teacher 2 (basic science faculty) engages at designated points in the session to provide foundational science integration, contextualising clinical findings within anatomical, pathophysiological, and pharmacological frameworks.

The medical educationist (Teacher 3) assumes an observer role during execution, using a structured observation instrument to assess session quality, script adherence, student engagement, and pedagogical technique. This observation data, combined with student feedback collected immediately post-session, constitutes the quality data that feeds the next preplanning cycle, completing the iterative improvement loop.

Patient dignity and consent are treated as non-negotiable parameters of the execution phase. The model requires that patient consent for student participation is formally obtained prior to the session, that the number of students at the bedside is limited to preserve patient comfort (recommended maximum: six), and that the clinical teacher explicitly models respectful patient communication throughout the encounter as a component of professional role modelling [36].

Stepwise Implementation Protocol

The AAS model may be operationalised through the following seven-step implementation sequence:

1. **Step 1:** Collect structured feedback from the senior cohort (one year above target group) regarding the previous cycle of equivalent bedside sessions.
2. **Step 2:** Convene Teachers 1, 2, and 3 to review feedback, select the clinical case or patient scenario, and agree on integrated clinical–foundational science learning objectives.
3. **Step 3:** Select the teaching case, ensuring suitability in terms of clinical richness, foundational science integration potential, patient suitability, and learning objective alignment.
4. **Step 4:** Confirm teacher assignments—one clinical specialist (Teacher 1), one basic/biomedical science faculty member (Teacher 2), and the medical educationist (Teacher 3).
5. **Step 5:** Develop the session script, specifying content sequence, teaching methods, time allocations, and assessment instruments, under the leadership of Teacher 3.
6. **Step 6:** Execute the planned bedside teaching session, with Teacher 3 in structured observation and quality monitoring role.
7. **Step 7:** Collect post-session feedback from students (beneficiaries) using validated instruments; analyse feedback data for incorporation into the next preplanning cycle.

Theoretical Positioning Among Existing Bedside Teaching Models

The AAS model is distinguished from existing CBT frameworks by its explicit three-role architecture and its systematic integration of vertical curriculum alignment, pedagogical design expertise, and iterative quality improvement within a single session structure. Established CBT models such as the One Minute Preceptor [45], SNAPPS [46], and the Aunt Minnie approach [47] are primarily cognitive frameworks for organising the clinical reasoning discussion during a teaching encounter; they do not address pre-session collaborative design or the integration of foundational science content.

The Stanford Faculty Development Programme and similar faculty development initiatives address the preparation of individual clinical educators but do not operationalise the multi-role collaborative structure that the AAS model proposes [34]. The AAS model is most closely analogous to team-based and interprofessional teaching approaches, which have been advocated but incompletely operationalised in the CBT literature, and to the concept of "academic detailing" in faculty development—structured peer collaboration to improve teaching performance [48].

APPLICATIONS, ADAPTATIONS, AND CONTEXTUAL CONSIDERATIONS

The AAS Three-Teacher Model was initially conceptualised for single-session surgical bedside teaching at the undergraduate level, but its architecture is applicable across a range of clinical specialties and educational contexts. In internal medicine, for example, Teacher 1 (the physician) might present a case of heart failure, while Teacher 2 (the physiologist or pharmacologist) integrates the Frank-Starling mechanism and the pharmacodynamics of diuretic therapy into the same encounter. In psychiatry, a clinical psychiatrist and a neuroscientist might co-design a session on major depressive disorder that integrates clinical phenomenology with monoaminergic

neurotransmission and the pharmacology of antidepressants.

For postgraduate and residency training, the model may be adapted by replacing the basic science faculty member with a subspecialty specialist, creating a two-clinician plus educationist structure that facilitates inter-specialty knowledge integration—for example, a surgical registrar and a radiologist co-designing a hepatobiliary imaging teaching session facilitated by a clinical education specialist.

In resource-constrained settings where a dedicated medical educationist is unavailable, the Teacher 3 role may be assumed by a faculty member with supplementary training in educational methods, or rotated among senior faculty with interest in education, while specific aspects of the pedagogical design function are supported by institutional faculty development resources. The model is designed to be scalable and does not require purpose-built infrastructure beyond scheduled collaborative planning time for the three teacher roles.

DISCUSSION

The AAS Three-Teacher Model represents a principled, structured response to a well-documented and consequential problem in contemporary medical education. Its central innovation is the recognition that effective CBT is not simply a function of individual clinical educator competence but of a collaborative design process that integrates clinical expertise, scientific depth, and pedagogical intentionality in a coordinated manner. This recognition reflects a maturation in the understanding of CBT as a complex educational practice requiring systematic institutional support, not merely individual goodwill.

The model's emphasis on vertical integration addresses one of the most persistent criticisms of traditional medical curricula: the artificial and counterproductive separation of basic science teaching (years one and two) from clinical science teaching (years three and beyond) that characterises pre-clinical/clinical binary curriculum structures [43]. Evidence consistently demonstrates that students who experience contextualised, clinically-grounded basic science instruction demonstrate superior retention and application of foundational knowledge in clinical settings [49,50]. By embedding a basic science educator as a co-teacher in the CBT encounter, the AAS model provides a structural mechanism for vertical integration that operates at the individual session level without requiring wholesale curriculum redesign.

The incorporation of the medical educationist as a formal teaching team member addresses another systemic deficit: the preparation of clinical educators for teaching roles. The Preparation Phase of the AAS model functions as embedded faculty development, creating a structured opportunity for clinician educators to engage with evidence-based teaching strategies and to receive observational feedback on their teaching performance from an educational specialist—a form of teaching supervision that is routinely applied in school education but rarely formalised in higher medical education [34,40].

The iterative feedback architecture of the AAS model—collecting upstream feedback from senior peers before session design and downstream feedback from participants after session delivery—reflects a quality improvement orientation that is increasingly recognised as essential to sustainable educational programme management [41]. This architecture transforms CBT from a practice sustained by professional tradition into one that is continuously evaluated and refined against explicit performance criteria.

Practical implementation of the AAS model will require institutional commitment to protected time for collaborative session planning, recognition of teaching collaboration in academic workload models, and investment in faculty development for the medical educationist role. These are not trivial requirements in healthcare environments characterised by intense workload pressure. However, the model is designed to be efficient in its demands: the collaborative planning phases are estimated to require two to three hours of combined faculty time per session, an investment that is comparable to the time currently expended on uncoordinated, individually planned teaching activities—but with substantially greater educational return.

The AAS model awaits formal empirical evaluation through prospective studies comparing student learning outcomes, clinical skill acquisition, and session quality metrics between AAS-model sessions and conventional CBT controls. The authors acknowledge this as a priority for future research and are currently developing a prospective evaluation protocol at King Faisal University College of Medicine. Outcome measures will include student performance on clinical skills assessments, session quality ratings using the Clinical Teaching Effectiveness Instrument (CTEI), script adherence rates, and longitudinal tracking of clinical competency across academic years.

FUTURE DIRECTIONS

Several directions merit priority attention in the further development and dissemination of the AAS model and the broader challenge of CBT revitalisation:

- **Empirical validation:** Prospective controlled studies and multi-site implementation evaluations are needed to establish the educational effectiveness of the AAS model relative to conventional CBT and other structured bedside teaching frameworks.
- **Digital augmentation:** Point-of-care ultrasound, augmented reality overlays, and tablet-based anatomy and pathology reference tools may be integrated into the Execution Phase to enhance the foundational science integration function of Teacher 2 without disrupting the bedside encounter.
- **Interprofessional adaptation:** The three-teacher structure is inherently extensible to interprofessional education contexts, where Teacher 2 might be replaced by a nursing, pharmacy, or allied health faculty member—transforming the model into a vehicle for interprofessional CBT that develops collaborative competencies alongside clinical skills [51].
- **Faculty development curriculum:** A structured faculty development programme based on the AAS model's collaborative design principles should be developed and formally evaluated as a standalone intervention for improving clinical teaching quality independent of the full model implementation.
- **Technological platforms:** Digital session planning and quality management tools, including structured script templates, electronic feedback instruments, and session quality dashboards, would facilitate wider adoption and enable comparative data collection across institutional implementations.

CONCLUSION

Clinical bedside teaching is not an educational luxury or a nostalgic remnant of a simpler clinical era; it is a pedagogical necessity for the production of clinically competent, empathetic, and professionally formed physicians. Its decline represents a genuine and measurable threat to the quality of medical education and, by extension, to patient care quality and safety in health systems staffed by graduates whose clinical formation was inadequate.

The Al-Mulhim–Alwadaani–Sabri Three-Teacher Model offers a structured, theoretically grounded, and operationally feasible framework for reversing this decline at the individual session level. By coordinating the expertise of the clinical educator, the basic science faculty member, and the medical educationist in a phased, iterative process, the model addresses the primary barriers to effective CBT—curricular disconnection, inadequate pedagogical design, and absence of quality feedback—within a collaborative architecture that is scalable across specialties, institutions, and resource contexts.

The model is offered not as a definitive solution but as a principled starting point for institutional action and scholarly inquiry. Its empirical evaluation, iterative refinement, and contextual adaptation across diverse medical education environments will determine its ultimate contribution to the restoration of clinical bedside teaching as the foundational pedagogy it has always been and must remain.

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