

Organizing Competency-Based Medical Education: Implementing PMDC's Seven Core Competencies.

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ABSTRACT:

In recent years, competency-based medical education (CBME) has moved away from discipline-based curricula toward clearly defined outcomes-based curricula. It stresses on the development of observable and measurable professional capabilities, to ensure that graduating doctors meet the real-world health care challenges. The Pakistan Medical and Dental Council (PM&DC) has listed seven core competencies that every new doctor in Pakistan should achieve. Nationally outlined and globally accepted benchmarks for competency-based medical education and accreditation were analyzed. This analysis considered the institutional framework, curriculum organization, teaching-learning methods, and assessment methods used at MMC. This review article explains how the seven PM&DC core competencies are included in a vertically integrated, outcomes-based MBBS curriculum at Muhammad Medical College (MMC), Mirpurkhas, while focusing on the overall curricular framework and the teaching-learning strategies used. This approach exhibits that integration of the PM&DC's seven skills into a hybrid, vertically integrated spiral curriculum leads to Active learning from the day one of medical student, with clinical experience, technology-enhanced learning, and multidimensional, competency-aligned assessment to aid and steer learning. It is therefore concluded that vertically integrating PM&DC's seven core competencies into a coherent, streamlined, outcomes-oriented MBBS curriculum helps the development of a clinically competent clinician who has a good grip of all three Bloom's domains. This model can be replicable in other medical colleges in Pakistan, which can produce doctors who can meet the country's diverse health care needs.

Keyword: PMDC, HEC, Integrated curriculum, competency based Medical Education

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Introduction:

In recent years, medical education has undergone a major global shift from traditional, discipline-based curricula to competency-based medical education (CBME)¹ with well defined outcome. Time spent during training is irrelevant instead emphasized over educational outcome-What student may be performed.² CME focuses on graduates' readiness to address real-world challenges.³ CBME focuses on outcomes-based processes, their implementation, and evaluation, using competencies as measurable abilities that all learners should grasp. These competencies are directly relevant to the safety of the patients and quality of care. The PM&DC has developed the "Seven Star Doctor" competency framework, which outlines the seven core, holistic competencies needed for practice medicine in Pakistan.^{4,5} This framework requires a doctor to be Knowledgeable, Skillful, Professional, a Scholar & Researcher, a Critical Thinker, a Leader & Role Model, and a Community Health Promoter. This proposed structure is more advance to "Five Star Doctor" model suggested by World Health Organization, additional competencies are related to health care system and socio-culture of Pakistan. Muhammad Medical College (MMC), Mirpurkhas, is located in a socio-cultural diverse region of Sindh province with a poor financial background. Ibn-e-Sina University, Mirpurkhas (ISUM) is the first university of Mirpurkhas division, recognized by the Higher education Commission (HEC).⁶ MMC is a constituent college of ISUM. The college

has developed various tools to embrace the PM&DC framework within its curricular and organizational planning to meet the PM&DC'S accreditation requirements and to address local health needs. MMC aims to develop operational competencies that reflect the full spectrum of professional expectations in contemporary medical practice, spanning multiple disciplines and domains.

This article presents our experience at MMC in organizing and implementing a competency-based MBBS curriculum. The PM&DC Seven Core Competencies Framework include:⁴

1: Knowledgeable (Scientific Knowledge for Good Medical Practice): This competency emphasizes the integration of foundational biomedical, clinical, and psychosocial sciences throughout the curriculum to support evidence-based diagnosis and management of health problems. MMC employs various methods of active learning, such as small group discussion, Case-Based Learning (CBL) and Problem-Based Learning (PBL). This is supported by a three-pronged system of "Survive". Survive was started at the beginning of COVID in March 2020, when face-to-face (F2F) teaching had become impossible for nearly the whole academic year. Since then, it has undergone need assessed modification and currently consists of weekly assignments, weekly MCQs-based tests, and a post-test discussion which addresses the mistakes committed by the learners in the weekly tests. The active learning, along with survive greatly helps the students to understand the molecular and pathophysiological mechanisms of disease, along with the application of pharmacological principles and clinical principles. This process brings together the basic medical sciences, clinical sciences, along with the behavioral and social sciences related to health and disease.

2: Skillful (Clinical, Cognitive, and Patient Care Skills): In its quest to be a national/international leader in producing quality doctors, Muhammad Medical College, Ibn-e-Sina

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University has developed a state-of-the-art Skills Lab/ Simulation Centre and a unique Program of teaching and training the 64 Clinical skills required by a doctor. Each skill will be taught at the skill/ simulation lab and will be strengthened in the wards. Following is the schedule of the program. Each session may be preceded by a brief introduction/video. A printed as well as an electronic logbook is maintained by each student. Their record is automatically updated and kept in their e-file and some marks are awarded in each modular/ annual examination to the student. 64 skills are arranged as

- * patient assessment by the medical students-22 in number.
- * procedural Skills-12 in number.
- * patient care -7 in number.
- * prescribing -5 in number.
- * therapeutic procedures -18 in number.

3: Professional (Professionalism, Ethics, and Communication): Along with other teaching and training to promote professionalism, our program of weekly mentoring greatly facilitates the components of professionalism in our students. Weekly mentoring is conducted between 1 to 2 pm every Wednesday. The mentoring program consists of

- * Mentees 8-10 in one group.
- * Mentor (one mentor for 8-10 mentees). There are 48 mentors in classes 1st to 4th year MBBS and 12 the in final year MBBS.
- * Mentor submits a weekly report, which is discussed with the chief mentor between 1-pm on Thursday (next day).
- * Class Coordinator (For a whole class). Will closely liaise with the mentors of his/her class and report to the Chief Mentor on a regular basis. If a mentor is not performing his mentoring duties or not filling the form, and the Class Coordinator fails to report to the Chief Mentor, he will be held responsible.
- * Chief Mentor
- * Program Supervisor.

Based upon feedback from students, mentoring program proved helpful in promoting empathy, ethical conduct, patient-centred communication, collaboration, and professionalism. It is reinforced through teaching these topics in the classroom and wards. The medical ethics and bioethics, communication skills training, professional conduct sessions, interprofessional education, faculty role modelling are now part of curriculum. Subsequently, to measure effectiveness of these newly introduced parameters, a scale known as "ISUMSAD" is used that has high reliability and validity is used by getting feedback from students. This would assist our students to respond appropriately to ethical dilemmas, improved cultural sensitivity, respecting confidentiality, and upholding their right to self-determination.

4: Scholar & Researcher (Research Skills and Scientific Inquiry): For the past 27 years, annual symposium is being held regularly at MMC. Students of 4th and final years select 2-4 peers; form a team to conduct research by selecting research question and present at the annual symposium. Students from other classes are encouraged to join too. Hence, every graduate of MMC has at least 2 research papers before graduating. Regular SPSS, biostatistics and research workshops are held too. A peer-reviewed published by the name of Journal of Muhammad Medical College is being published regularly since last 16 years and recognized by the PM&DC as well as HEC.

5: Critical Thinker (Clinical Reasoning and Problem Solving): Analytical thinking, decision-making, problem-solving and reflective practice are promoted through problem-based learning (PBL), case-based learning (CBL), structured clinical reasoning activities, and exposure to uncertainty and complexity in patient care. Weekly Journal Club and case presentation by the students are held regularly.

6: Leader and Role Model (Leadership and Management): MMC provides its students lots of opportunity to gain leadership and management skills. Students are represented in virtually every committee. Regular sports, debates and other co-curricular activities are held at regular basis.

7: Community Health Promoter (Community Orientation and Health Advocacy): Mobile Clinics by Students (MCS Program) is another example of ISU commitment to community-oriented medical education and learning in real social context. In collaboration with the Association of Pakistani Physicians of North America (APPNA), ISUM expanded the MCS Program from two to five health units covering impoverished villages in the Mirpurkhas District. APPNA donated three mobile clinic vehicles designed for the delivery of primary healthcare, making it possible to set up fixed health units in:

- * 78 Mori Village - Inaugural camp served 680 patients
- * Wahgreji Village - Inaugural camp served 617 patients
- * Khirao Village - Inaugural camp served 1,039 patients (Mar 2018)
- * Sultanabad Village - Inaugural camp served 1,282 patients (Mar 2018)
- * Rakhel Lund Village - Inaugural camp served 450 patients (Nov 2018)

The mobile clinics operate on a predetermined cycle from Monday to Thursday, offering free medical consultations and medications, and making referrals to Muhammad Medical College Hospital for patients needing higher-level care.

Curriculum Organization and Delivery: MMC follows an integrated hybrid spiral curriculum, guided by Harden's integration ladder,⁷⁻⁹ which outlines levels of integration from a discipline-based approach to a fully integrated, student-centred model. This structure supports the vertical integration, where topics are revisited over time with increasing complexity.^{10,11} MMC organizes teaching into organ-system modules to promote inter-disciplinary contextual learning and support students develop the concepts derived from basic science to clinical medicine. The curriculum comprises of over 6,200 teaching hours, which fulfils the PM&DC and WFME guidelines,¹² distributed across basic sciences, pre-clinical and para-clinical sciences, clinical rotations, community medicine, and elective experiences.

Innovative instructional strategies: Teaching at MMC uses a range of evidence-based methods to promote active learning, clinical integration, and competency development. Active learning approaches such as Problem-Based Learning (PBL),¹³ Case-Based Learning (CBL), Team-Based Learning (TBL), and flipped classrooms encourage students to participate actively¹⁴ rather than remain passive recipients of information. Small-group peer teaching, collaborative problem-solving, and structured discussions further support understanding and long-term retention. Early Clinical Exposure (ECE) introduces students to clinical settings from Year 1, with a gradual transition from simulation to real patient encounters. This longitudinal exposure strengthens their grasp of basic science concepts, supports professional identity formation, and builds clinical skills.

Technology-enhanced learning: Modern technologies are embedded throughout the curriculum. Campus Management System has been developed. Famous learning management systems (LMS), Moodle is used to organize resources, support online activities, and facilitate formative as well as summative assessment and feedback.

Clinical skills and simulation training: Skills development and simulation center create realistic scenarios in which learners rehearse emergency management, critical decision-making, and teamwork in situations that simulate actual clinical practice.¹⁵

Assessment strategies

Assessment framework: Assessment at MMC's CBME system is aligned with clearly defined competencies and uses Moodle for a range of MCQs as tests and OSCE. Evaluation is continuous and combines formative assessment, which guides learning and improvement, with summative assessment, which informs decisions about progression and graduation. The assessment programme is designed to be valid, reliable, feasible, educationally impactful, and supportive of learning.

Formative assessment: The curriculum is structured to identify learning gaps early and provide timely support. Continuous formative assessment provides regular feedback and encourages self-directed learning. Key elements include:

- * Assignments through the learning management system (Moodle).
- * Peer and self-assessment during group learning activities.
- * Feedback from faculty during clinical skills sessions and simulations.
- * Reflective writing tasks, particularly before major examinations, which are reviewed and commented on by instructors.

Summative assessment: Summative assessments determine whether students have achieved the expected level of competence to progress and ultimately to graduate. These include:

- * Weekly MCQs tests are conducted in "Survive".
- * Objective Structured Clinical Examinations (OSCEs) with multiple stations to assess clinical skills, communication, professionalism, and clinical reasoning.
- * Workplace-based evaluations that capture performance in real clinical settings, such as:
 - Mini-Clinical Evaluation Exercise (Mini-CEX): observed clinical encounters with structured feedback on organization, clinical judgment, and professionalism.
 - Direct Observation of Procedural Skills (DOPS): assessment of technical and procedural skills, including consent, asepsis, and post-procedure care.
 - Case-Based Discussion (CBD): in-depth discussion of real cases managed by the student, focusing on reasoning and application of knowledge.
 - Multi-Source Feedback (360-degree evaluation): feedback from colleagues, peers, nurses, and other team members on collaboration and professional behaviour.
 - Reflective portfolios in which students document learning experiences, self-assess their competencies, and record community work and other professional activities.

Institutional support and quality assurance: Successful implementation of CBME at MMC relies on strong institutional commitment. This includes investment in infrastructure, sustained faculty development, appropriate resource allocation, and a culture that values ongoing quality improvement. Faculty development initiatives include a 20-week Certificate in Health Professions Education (CHPE), which trains cohorts of faculty members in:

- * Principles of CBME and curriculum design.
- * Contemporary teaching methods such as PBL facilitation, CBL, and flipped classrooms.
- * Assessment design, including OSCEs, workplace-based assessment, and effective feedback.
- * Teaching professionalism, ethics, and communication.
- * Clinical mentoring and supervision.
- * Educational scholarship and research in medical education

Regular workshops, teaching-skills courses, peer master-classes, and national and international medical education events support ongoing development. Recognition and rewards for good teaching encourage innovation and sustained engagement.

Sustained allocation and infrastructure of resources: To support CBME, MMC maintains:

- * Clinical skills laboratories are equipped with task trainers, standardized patients, and simulation devices.
- * Robust IT infrastructure with adequate bandwidth, computer facilities, learning management systems, and digital libraries.
- * Access to journals and databases to enable evidence-based practice and research.
- * Units that provide support in research methodology, biostatistics, and ethics.
- * Community health centres and field-practice sites for community medicine teaching.
- * Sufficient clinical training sites with adequate case mix for comprehensive clinical exposure.

Educational environment and culture: MMC promote a student-centred educational climate where learners are actively involved in curriculum planning and quality improvement. The environment is designed to be psychologically safe, encouraging students to raise concerns, identify gaps, and seek help. Mentorship and feedback are embedded through:

- * Peer-assisted learning, where senior students support juniors in academic and professional development.
- * Interprofessional education alongside nursing, pharmacy, and allied health students.
- * Wellbeing initiatives addressing mental health, stress management, and work-life balance.

Quality improvement within quality assurance: The curriculum committee leads continuous quality improvement by:

- * Regularly reviewing and updating the curriculum in response to educational evidence and changing health system needs.
- * Collecting feedback from students, faculty, alumni, employers, and patients.
- * Analysing assessment data to identify trends, evaluate teaching methods, and detect at-risk learners early.
- * Benchmarking against PMDC standards and international best practices.
- * Conducting internal reviews and preparing for external accreditation visits.

- * Supporting research in program evaluation and graduate outcomes.

Conclusion:

The MMC experience shows that, when the PM&DC seven-star competency framework is applied deliberately, graduates are better prepared to handle the complex clinical, ethical, and social challenges.¹⁶ The model matches well with international competency frameworks such as ACGME, CanMEDS, and the WHO Five-Star Doctor,^{17,18} while remaining responsive to local priorities. MMC has been successful in embedding competencies within an integrated, curriculum.¹⁹ MMC makes sure that professionalism, research skills, and community orientation are never neglected and leave a lasting impression to its students.

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