COVID-19

Efforts to cope with CBME in COVID-19 era to teach biochemistry in medical college

Shilpa Suneja | Sukanya Gangopadhyay | Charanjeet Kaur

Department of Biochemistry, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi, India

Correspondence
Shilpa Suneja, Department of Biochemistry, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi 110029, India. Email: shilpasuneja@rediffmail.com

Abstract
The COVID-19 outbreak has shut down universities and prompted the teaching faculty to move to online resources. In view of upcoming of new Medical Council of India (MCI) curriculum and outbreak of COVID-19 pandemic, keeping pace with medical education became a challenge. To keep on par with learning activities of undergraduate students during this period, the teaching faculty adopted the use of online resources. E-learning tools were utilized to engage first-year undergraduate students and satisfy majority of aspects of Competency-Based Undergraduate Medical Curriculum/Education (CBMC/E) in Biochemistry.

1 | INTRODUCTION

The Medical Council of India (MCI), a body that is entrusted with standardizing medical education, had put forth Graduate Medical Education regulations which aim at providing training for medical undergraduates to recognize the health rights of all citizens, learn every aspect of national health policies and devote himself/herself to addressing the health needs of the society (1). Thus, MCI has described the basic competencies required by an Indian Medical Graduate which are listed in Table 1 (2) and designed a competency-based module on attitudes and communication. There has been wide adoption of this Competency-Based Undergraduate Medical Curriculum/Education (CBMC/E) and is being rolled out in phase manner with new undergraduate batch joining from 2019. Faculty orientation and training was done in a cascading manner starting with the training of conveners and co-conveners from regional/nodal centers in January 2020 at MCI headquarters till faculty trained by trained peers at institute level in May–June 2020 (2).

CBME is an approach to prepare physicians for practice that is fundamentally oriented to graduate outcomes abilities and organized around competencies derived from an analysis of societal and patient needs. It discourages the current time-based training and promises greater accountability, flexibility, and learner-centeredness (3). Various components of CBME are listed in Table 2 (4).

2 | GROUND SITUATION

CBME curriculum was running successfully till December 2019, when COVID-19 outbreak occurred in 2020, in India. The increasing cases of infection during this pandemic prompted near-total closure of schools, colleges and universities and affected educational system worldwide. To mitigate COVID-19, impact on education, UNESCO, and other organizations including MCI, recommended use of distance learning and prompted institutions of higher education to switch over to online teaching to keep pace with teaching learning activities.

Recognizing the need during this unexpected transition, Department of Biochemistry in Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India, a premier institute that is included in World Directory of Medical Sciences and the Avicenna Directory of Medicine adopted e-learning platforms.

While online teaching tools have always existed, this large-scale transition to online teaching was sudden for most teaching professionals, as the MBBS program for the first-year students in Biochemistry, in pre-COVID
era, did not use any structured e-learning tools for teaching and assessment barring use of power-point presentations and specific topic related animated video presentations in classroom.

We incorporated the use of Microsoft Teams (5) as a Learning Management System (LMS) for teaching, learning, and assessment module in biochemistry. Assessments were also conducted using Google Forms. Use of e-mail and WhatsApp modes were also utilized for communication and updation of information to students and other faculty members.

### 3 | APPROACH

The first year curriculum, taught in a system-based manner, includes anatomy, physiology, and biochemistry along with professional and personnel development modules. Biochemistry is taught using mainly lectures, followed by self-directed learning (SDL), small group discussions, case-based learning, problem-based learning (PBL), seminars, early clinical exposure (ECE), integration, and attitude, ethics, and communication (AETCOM) modules according to new curriculum.

#### TABLE 1 Competencies expected of an Indian medical graduate

| Competency                  | Description                                                                                                                                 |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Clinician                   | Who understands and provides preventive, promotive, curative, palliative, and holistic care with compassion                                   |
| Leader and member of the health-care team and system | Ability to take everyone along to deliver the outcome in time bound manner more efficiently and effectively with capabilities to collect, analyze, synthesize, and communicate health data appropriately |
| Communicator                | With patients, their families, colleagues, community and political leaders to influence by providing evidence-based interventions             |
| Lifelong learner            | With a commitment to the continuous improvement of skills and knowledge as per the change in medical technologies and epidemiological shift |
| Professional                | Who is committed to excellence, ethical, responsive and accountable to patients, community, and the profession                               |

#### 3.1 | Teaching and learning approaches adopted during COVID era

LMS platform was utilized to conduct the above activities as follows:

1. Lectures were taken online which included power-point presentations.
2. Learning resources including links to articles and You Tube videos, explaining the concepts, were uploaded for students (Figure 1).
3. Class attendance and other activities involving students' engagement in class were observed and recorded on “Insight” platform.
4. Announcements were made about forthcoming activities, which were planned for the students, at least a week before.
5. Handouts of practicals, requiring demonstrations, were uploaded.
6. ECE activities, which included clinical case discussions were planned in co-ordination with clinicians on online portal.
7. Integration of case studies was done, by involving faculties of the respective departments along with undergraduate students.
8. Quiz, comprising of multiple-choice questions (MCQs), short answer questions, multiple true and false were conducted, from time to time, to assess students' knowledge.
9. During lectures, students' involvement within class was judged by creating polls.
10. Assessments:

   a. **Summative assessments** were conducted online, by uploading the question paper and students were required to complete it and upload their answer sheets, back on the portal, within stipulated time for correction by the faculty members.

   b. **Formative assessments** were planned during online lectures as well as offline by creating polls, quiz, crosswords, MCQs, and short answer questions. Assessment tools that were utilized were Kahoot Quizzes, Socrative online tool for quizzes, multiple choices and short answers, and Mentimeter software for interactive learning sessions.

#### 3.2 | Pedagogical approaches adopted during online classes

Various pedagogical approaches (6) were utilized to meet the desired competences in the online classes as mentioned in Table 3.
OBSERVATIONS

On completion of all the lectures and practical sessions, it was found that the learning outcomes were fully attained. After collecting the data, which included the time, the student logged in, spent time on online sessions, their active involvement in class in the form of queries and doubts related to topics covered and interests shown in lectures and the final scores of assessments, indicated active involvement, interest, and understanding of the concepts of student community. In addition, uploading of learning resources and instructional videos, further motivated the students to learn more.

Furthermore, incorporation of various online tools to address various pedagogies led to inference that some competencies are better covered by inclusion of online platform in teaching and learning methods.

### TABLE 2 Components of Competency-Based Medical Curricula (4)

| Component                                   | Brief overview                                                                                                                                 |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Subject-wise subcompetencies                | All subjects have been classified into three categories (a) preclinical and paraclinical subjects, (b) medicine and allied (including community medicine), and (c) surgery and allied. A total of 412 topics with 2949 outcomes (subcompetencies) have been derived and compiled by subject experts. A three-volume standalone document is available on Medical Council of India (MCI) website (4). |
| Foundation course                           | One month, immediately after the admission, will be dedicated to orient new students about the teaching program, help them learn language (English and local language), computer use, communication skills, time management, handling stress as well as for sports and extra-curricular activities. |
| Attitude, ethics, and communication (AETCOM)| AETCOM module has been prepared as a guide to facilitate institutions and faculty in implementing a longitudinal program that will help students acquire necessary competence in the attitudinal, ethical, and communication domains. |
| Early clinical exposure                     | In order to provide clinical context and ensuring patient centricity, the student will be provided clinical exposure starting from first year itself. It shall focus on basic science correlation, basic clinical and soft skills, and humanities in medicine. |
| Alignment and integration of learning       | To help bridge the gap between hospital-based and community-based medicine and between basic and laboratory services with clinical relevance. |
| Elective module                             | They have been introduced for flexible learning and providing opportunities to the students to get taste of future career and allow them to pursue academic interests, do projects and work in diverse environment outside the traditional boundaries of core program. |
| Skill acquisition and certification         | A mandatory and desirable list of competencies to be obtained by Indian Medical Graduate (IMG) has been evolved by MCI. Institutes are mandated to create skill laboratories and dedicated time for basic skills acquisition has also been appropriated in the time table. |
| Revision of training learning formats       | Emphasis will be on student-centric (interactive and small groups) and interactive (problem-based, case-based, team-based) learning. During the clinical phase, student doctor method of clinical training will be promoted. Students will be provided ample opportunities for self-directed learning. |
| Multifaceted Assessments                    | Formative assessments and summative assessments will be conducted. A provision has been made for assessment of skills and AETCOM competencies |
| Logbook                                     | It is a verified record of the progression of the learner, documenting the acquisition of the requisite knowledge, skills, attitude, and/or competencies. |
| Faculty development initiatives             | They help in sensitizing the medical teachers to the concepts involved in competency based medical education and help them acquire knowledge and clinical skills to become effective teachers. |

**FIGURE 1** Contents shared on Microsoft teams [Color figure can be viewed at wileyonlinelibrary.com]
5 | LIMITATIONS

Undergraduate practical skills like working in the laboratory or direct patient-interaction, as required in ECE, are affected due to inaccessibility to labs and hospital during this pandemic. Furthermore, dimensions such as ease of navigation, fun or boring aspects, independence, and collaboration, were difficult to assess. Net connectivity during online sessions remains an issue in remote areas in developing country like India.

6 | SCOPE

In an effort to meet the challenges, created by disruption of physical classrooms, we discovered the unanticipated benefit of the pandemic-induced transition from face to face interactions to increased use of technology, both at faculty level and student level. We should acknowledge these e-learning resources and make them an indispensable part of teaching and learning process in future.

| S. No. | Pedagogical approach                 | Methods adopted                                                                                                                                 |
|--------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.     | Lecturing                           | Apart from power-point presentations that were included in traditional style teaching, Open Broadcaster Software (OBS) was utilized to create video lectures to teach class material and concept development. Edpuzzle software was also used to for video lecturing. |
| 2.     | Mind and concept maps               | Freemind Online Software was utilized to create cognition/concept maps which were then made available to students on Learning Management System (LMS) online platform. |
| 3.     | Problem-Based Learning (PBL)/Self-Directed Learning (SDL) | Students were divided in batches of 6–10, to work in self-directed, collaborative groups to address to or inquire various problems related to a given competency among their peer-group on online portal. |
| 4.     | Interdisciplinary team teaching     | Horizontal and Vertical Integration was planned online with specialists in specific fields of desired competencies to help students explore inter and trans disciplinary topics related to the course material. |
| 5.     | Case studies                        | Case studies were planned online, during early clinical exposure (ECE) classes, where qualitatively rich description of settings, problems and controversies were discussed by clinicians with the students to consider real-world examples in clinical settings. |
| 6.     | Jigsaw/interlinked teams            | Online tool of “Hot Potatoes” was utilized to create Jigsaw quiz and crosswords, to help students gain confidence, interest and affective engagement in the subject topic. |
ORCID
Shilpa Suneja https://orcid.org/0000-0002-8650-2313

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