Teaching, Learning, and Assessment in Geriatric Dentistry: Researching Models of Practice


Abstract: Changing demography due to the increasing population of elderly persons the world over has raised new challenges in every sphere of life. The greatest challenge is to provide affordable, accessible, and equitable health care to this population. Oral health is an integral part of general health and affects physical and mental well-being and quality of life of elderly persons. To provide quality oral health care to the elderly, it is important to focus on education in geriatric dentistry; since it is known that education is closely linked to health care provision. It has been found that education in geriatric dentistry has wide variations in different parts of the world. Also, it is being taught at different levels: the predoctoral curriculum, postdoctoral certificate/diploma courses of varying duration by direct or distance mode using computer-assisted learning, degree courses of three years’ duration, or continuing education programs. This article attempts to study geriatric dentistry education in global perspective. It is discussed in three sections: 1) varying concepts and methods of teaching, learning, and assessment in dental education; 2) status of geriatric dental education in developed and developing countries with emphasis on the Indian scenario; and 3) challenges and opportunities in developing geriatric dental education.

Dr. Shah is Professor and Head, Department of Conservative Dentistry and Endodontics, as well as Chief, Centre for Dental Education and Research, All India Institute of Medical Sciences. Direct correspondence and requests for reprints to her at Centre for Dental Education and Research, All India Institute of Medical Sciences, New Delhi 110029, India; 91-11-26589304; naseemys@gmail.com.

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In 1972, a World Health Organization (WHO) commission concluded that “education is inextricably interwoven with the health services system.” This statement cannot have more direct implication than in the field of geriatric dentistry. Patient and community health outcome is shown to be directly related to the education of health practitioners. Quality of health care by graduates, especially to the elderly, is likely to be related to their education. Without firsthand experience of growing old and adequate knowledge of social, psychological, and economic aspects of growing old, the dentist will be prone to errors, especially of omission. It has been reported that the attitude of dental students towards elderly patients is more or less neutral when regular dental curriculum is followed. Unless education in care of the elderly was included, it is difficult to change students’ attitude from neutral to positive for better health care delivery.

The need for geriatric dental education was realized in the late 1970s. Yellowitz and Saunders, Kress and Vidmar, and Ettinger were the pioneers who championed the cause for special education needs for geriatric dentistry. The process of education is comprised of teaching, learning, and assessment. It needs a holistic approach. In-depth theoretical knowledge, clinical skills, and behavioral management are the keys to successful management of care seekers, especially the elderly patients.

The student/learner is at the center of focus for all educational activities: teaching, learning, and assessment. Therefore, before these issues are discussed, it is important to define the expected outcomes of all the educational exercises. In other words, what competencies are expected of the student after completion of training? Epstein and Hundert defined competence in medical education as “the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individuals and communities being served.” Plasschaert et al. described competencies required in dentistry under seven specific domains: professionalism; communication and interpersonal skills; knowledge base; information handling and critical thinking; clinical information-gathering; diagnosis and treatment planning; and establishment and maintenance of oral health and health promotion. Kress and Vidmar listed competencies required in a geriatric dentist in the following three domains:
Education has changed from teaching facts to helping students develop the intellectual tools and strategies needed to acquire knowledge. The goal of education is to help students develop the intellectual tools and strategies needed to search for new knowledge. The ultimate aims of teaching and learning are to acquire knowledge, skills, and a broad vision to search for new knowledge. The goal of education is to help students develop the intellectual tools and learning strategies needed to acquire the knowledge. Education has changed from teaching facts to helping students to learn how to find relevant information, how to access it, and how to organize disparate information into a cohesive whole, especially in an era of information explosion.

**Methods of Teaching/Learning**

Evidence-based health care educational interventions include knowledge, critical appraisal skills, attitudes, behaviors, or performance related to the practice of evidence-based oral health care and patient health outcomes. However, the gold standard for health care, randomized clinical trials (RCTs), has limited relevance in the education context, given the numerous variables that cannot be controlled or explained. It is also critical that evidence-based education is not interpreted too narrowly with a focus on “what works” when, in fact, research of practice only provides knowledge of “what worked.”

In medical education, problem-based learning (PBL) is the flagship of all learning methods. It is a student-centered, instructional strategy in which students collaboratively solve problems and reflect on their experiences. It was pioneered and used extensively at McMaster University, Canada. In PBL, learning is driven by challenging, open-ended problems. Students work in small collaborative groups, and teachers take on the role as facilitators of learning. It represents a change in focus from teachers and teaching, in conventional programs, to learners and learning. Winston Churchill’s commentary on his own education—“I hate to be taught, but I love to learn”—captures the positive attributes of PBL. PBL has a four-decade track record in medical education. It makes use of carefully facilitated, small-group tutorials in a resource-rich environment. Students and faculty in well-orchestrated PBL experience positive attitudes, energy of intellectual exchange, sense of personal involvement, and stimulation of discovery. A cross-sectional study conducted on fourth-year medical students at Karachi Medical and Dental College, Pakistan, found that a majority (85 percent) said PBL was helpful in developing their communication skills, interpersonal relationships, problem-solving capacity, and activation of prior knowledge. The medical detective format of PBL for diagnosis may not be well suited to the traditional dental school curriculum. However, PBL could be used more effectively when the treatment decision is uncertain, e.g., whether to treat a case surgically or nonsurgically, how to deliver treatment in the light...

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**Teaching/Learning in Medical/Dental Courses**

The ultimate aims of teaching and learning are to acquire knowledge, skills, and a broad vision to search for new knowledge. The goal of education is to help students develop the intellectual tools and learning strategies needed to acquire the knowledge.
of anatomical constraints, medical comorbid conditions that may complicate treatment, and patients’ financial condition. The negative points of PBL are the cost involved (student-teacher ratio) and insufficient grounding in basic sciences. Therefore, a hybrid PBL program in which PBL is guided through a structured format, with matching methods of assessment, can foster development of knowledge, skills, and attributes that oral health professionals will need in the future.

Competency-based dental education was introduced in 1993. It is based upon early course planning of clearly specified outcomes of learning, as against the traditional approach, which was mainly discipline-based. A competency describes the skills, understanding, and professional values of an individual ready for beginning independent health care practice. It is important to emphasize that it is the responsibility of the learner to constantly update his or her competence by reflection on experiences, attending continuing education programs, and postdoctoral courses.

Outcome-based education is similar to competency-based education. It focuses on learning outcomes and not on learning objectives. Harden et al. has described learning outcomes for the dentist, emphasizing the need to keep them unambiguous and manageable without overwhelming details. The learning outcomes are described in a simplified model of three circles: what the doctor is able to do, how the doctor approaches his or her practice, and the doctor as a professional, which is adapted to dentistry.

In inquiry-based teaching-learning (IBTL), inquiry is the umbrella concept partnered with teaching and learning. This may reflect a greater emphasis at school level on the process of learning and development of, for example, sciences as inquiry. At the university level, especially in medical education, the problem-based rather than inquiry-based concept is more popular (such as solving a problem), visible, and influential. Felett compared IBTL with PBL in terms of precision of methods, intentions, and teaching-learning environments. He found that PBL had a tightly structured, problem-solving tutorial process in a resource-rich environment for a smaller, high-achieving, and motivated group of students. As against this, the IBTL tutorial process was less tightly structured for a larger group of students with average academic achievements in a resource-poor environment. Hence, IBTL was a more open-ended and adaptive process of learning. In active, inquiry-driven learning, students convert unorganized, static information into interlinked chains of networked knowledge.

Use of Newer Technology in Teaching and Learning

Information and communication technology (ICT) has a two-way relationship with teaching and learning; both can influence and trigger the growth of the other. Evolution of ICT has transformed the learning experience for students as there is faster transmission of information; it is always on and allows for increased interactions.

Interactive multimedia, also known as “rich media” (which combine text, illustrations, videos, etc. with feedback), are a very powerful tool for teaching and learning. With its high storage capacity, CD-ROMs and DVDs are ideal for computer-assisted learning (CAL) programs for continuing education programs. A study from Hong Kong on the effectiveness of CAL in undergraduate clinical teaching showed equivocal learning improvements with other teaching methods in clinical dentistry.

Virtual learning environments (VLE) or virtual classrooms permit a learner to interact with other learners, learn by doing, and collaborate by learning tasks. This has allowed a shift from lecturing and telling (sage on the stage) to facilitating and guiding (guide on the side). Videoconferencing is one method that can be very effectively used for quality remote teaching, especially where there is a shortage of teachers. Webcasting or Internet broadcasting, in which live or prerecorded audio or video is transmitted through the Internet, can be another powerful aid in teaching/learning. It has the advantage of being available globally, 24/7.

Virtual reality or simulation is an emerging technology that can have implications in teaching and learning, where multiple infrared LEDs and infrared sensors are used to perform tasks such as cavity and crown preparation, giving real-time feedback in 3-D. However, the human element, real tutor, and patient’s importance in teaching/learning can never be undermined.

Learning Styles and Approaches

It has been found that students learn differently and use different learning approaches. Learning style is defined as “predisposition on the part of a student to adopt a particular learning strategy, regardless of the specific demands of the learning task.”
reflects the attitudes and behavior of an individual’s preferred way of learning. Honey and Munford have described four types of students: 1) the activist, who responds best when facing a challenge; 2) the reflector, who responds well when given time to reflect on a new learning experience; 3) the theorist, who responds best when given clear aims and objectives to his or her studies; and 4) the pragmatist, who responds when it is perceived to be relevant to practice. Marton and Saljo described two learning approaches: surface and deep. In surface learning, the student develops coping strategies focused on reproduction of essentials for assessment rather than for understanding. In the deep learning approach, the student integrates knowledge from other parts of his or her study and forms conceptual frameworks to find novel solutions to problems. A further approach, a strategic or an achieving approach, has been added, in which students aim to achieve the highest grade whether or not they grasp the subject.

Some students prefer to learn individually, while others may prefer to learn in groups. Others adopt a learning style that relies heavily on use of multiple resources like print media or computer-based educational multimedia. However, the most important aspect of learning is that the student should enjoy the learning process. Enjoyment and success create a winning cycle in the learning environment.

Kersten has proposed three principles of teaching and learning. First, the best learning occurs during self-study. Therefore, sufficient time for self-study should be given to the students, in proportion to classroom teaching, clinical work, project assignments, etc. But the students require guidance for self-study, and few contact hours should be earmarked for this purpose. The greater the workload, the more likely it is that students tend to learn “superficially.” Second, learning materials should be meaningful, relevant, and presented in logical order to the students. Third, favorable learning conditions should be provided that contribute to learning.

For a student of geriatric dentistry, a synthesis of all these different teaching-learning approaches is required to manage different types of older persons with different challenging treatment needs. Deep learning—which aims at integration of wide knowledge, not only comprising technical aspects but basic sciences (physiology, genetic and psychosocial aspects of aging, age-related diseases and disabilities, general medicine, pharmacotherapeutics in the elderly, etc.)—should be encouraged.

### Assessment

The objectives of assessment are to optimize the capabilities of the learner, to protect the public by identifying incompetent clinicians, and to select applicants for advanced training. There are two types of assessments: formative and summative. Formative assessment helps in guiding future learning and promotes reflection and shaping values. It reinforces students’ intrinsic motivation to learn and encourages them to achieve higher standards. Summative assessment is used for making an overall judgment about competence and fitness to practice or to test for advancement to higher levels of responsibility. Though it provides regulation and accountability, it acts as a barrier to further practice or training.

It is important that assessment methods meet the following criteria to be useful: 1) reliability (accuracy and reproducibility); 2) validity (whether it actually measures what is claimed to be measured); 3) impact on future learning and practice; 4) acceptability to learner and teacher; and 5) cost (to individual trainee, the institution, and the society/nation at large).

Different methods of assessment can be used depending upon the competency to be tested:

- **Written examination.** Open-ended questions can either be context-rich or context-poor. Context-rich questions need complex cognitive processes that are required in clinical practice. Context-poor questions are used to test basic factual knowledge, but they are not relevant or transferable to clinical situations. Assessment by multiple-choice questions (MCQs) is a popular method, as a large number of topics can be covered. The exam can be objectively graded by computers and hence can be standardized. However, this method of testing has the disadvantage of “cueing effect”—i.e., the correct answer could be recognized by the examinee but, in the absence of options, the answer would not have been possible. Therefore, it is not useful or may prove counterproductive when testing diagnostic acumen of the trainee.

- **Assessment by supervising clinicians.** This is the most commonly used method to evaluate trainees’ performance, though subjectivity can play a role in such assessment. Also, direct observation of trainees by the busy clinician supervisor when they are interacting with the patients may be too infrequent.

- **Clinical simulation.** This method of assessment is accomplished by using standardized patients
(actors who portray themselves as patients consistently, on repeated occasions) or on mannequins. The advantage of using standardized patients is that the students gain realistic experience that could be used for learning to perform clinical examination, diagnosis, and treatment planning.\(^2\)

- **Multisource (360 degree) assessment.** This method can be performed by peers, other members of clinical team, and the patients, but the sources should be reliable. With thoughtful ratings and comments by peers and support from advisors, the process of 360 degree assessment is powerful, insightful, and instructive.\(^3\) But it requires trust and scrupulous attention to confidentiality. Patients’ ratings are typically high, but ratings by nurses are considered valuable.

Assessment in geriatric dentistry would depend on education level (predoctoral, postdoctoral, or continuing education program) and methods (by direct contact or by distance learning mode). Formative assessment at frequent intervals and 360-degree summative assessment at the end of the course would be highly desirable to produce a competent, caring, knowledgeable, and skillful geriatric dentist.

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**Global Perspectives on Geriatric Dentistry Education**

Geriatric dentistry is better developed in most of the developed nations such as the United States, Canada, United Kingdom, Australia, and the European nations, as compared to the developing world. Some component of geriatric dentistry is included in the predoctoral curriculum, and postdoctoral diploma courses of two years’ duration are being offered at several universities. Recently, a resource guide on geriatric education from five U.S. universities has been presented.\(^4\) These programs emphasize the need for interdisciplinary models, integration with special needs patient care, and community-based geriatric education models.

Predoctoral geriatric dentistry education in U.S. and Canadian dental schools was evaluated by a survey.\(^5\) It was found that 58 percent of dental schools supported geriatric dentistry in their budgets. The barriers identified to expansion of geriatric dentistry education were lack of trained manpower, crowded curriculum, and fiscal concerns. In another survey of fifty-four U.S. dental schools, it was found that all the schools had some component of geriatric dentistry in their curriculum.\(^6\) Ninety-eight percent had didactic material, and 67 percent also had a clinical component. Thirty percent of the schools had a specific geriatric dentistry clinic within the school, and 11 percent had a clinic at a remote site. Sixty-three percent had a geriatric dentistry program director/chair. Over one-third of the schools had plans to expand the teaching of geriatric dentistry. However, teaching was more of a didactic nature, with very little of clinical experience both intra- and extramurally.

In European Union countries, a similar survey of 194 dental schools in thirty-four European countries was conducted.\(^7\) The response rate was only 42 percent. Eighty-two schools in twenty-seven countries responded. Thirty-six percent offered a specific geriatric dentistry course that included didactic teaching or group seminars, and 21 percent had organized presentations in their curriculum, while 36 percent had few occasional lectures and 7 percent had no teaching in geriatric dentistry. A clinical component of teaching of geriatric dentistry was found in 61 percent of responding schools. Of these, 45 percent had a geriatric clinic within the school, and another 29 percent provided training both at the school clinic and at a distant location from the dental school. Seven percent had a mobile dental clinic for treating elderly patients. Twenty-eight percent had a geriatric dentistry program director/chair. Thirty-nine percent indicated that they planned to extend geriatric education in the future. It was concluded that geriatric dentistry education was firmly established in European dental schools, though information from 58 percent of the schools was not included. A postgraduate specialization program in one of the European Union countries has defined seven modules for training in geriatric dentistry: affinity; somatic and mental disabilities; communication skills and coping with behavioral disturbances; emergency medical care; history taking, assessment, prevention, treatment, and evaluation; organization and legislation; and scientific training.\(^8\)

Geriatric dentistry in the undergraduate curriculum in dental schools in Germany (thirty-one), Switzerland (four), and Austria (three) was studied by a survey.\(^9\) In Austria, only a very small component of geriatric dentistry was included in the
curriculum, and the deans did not wish this to be increased. In Germany, most of the universities claimed to teach some aspect of geriatric dentistry to predoctoral students. In Switzerland, gerodontology was compulsory, and geriatric dentistry seemed to be well established. In all three countries, teaching was primarily by mode of lectures, with very little clinical training in nursing homes. In Switzerland, lectures in gerodontology were included in two terms comprising 23 percent of total lecture course, in Germany 7.5 percent, and none in Austria. The lectures covered oral hygiene and prevention, nutrition, geriatrics, and gerontology. The leaders of German schools felt that geriatric care should be integrated into main lectures, as the undergraduate course was already crowded. An interesting argument against any specialized teaching in gerodontology was that it might stigmatize older adults.

In developing countries, geriatric dentistry has not received the attention of dental professionals and policymakers, though one-sixth of the total world population of elderly now lives in the developing countries of Southeast Asia. In China, though its population of elderly is large, it has more than fifty dental schools to serve its large population of 1.3 billion people. With limited resources, China is challenged to increase its dental human resources to provide oral health care to the largest population in the world. Most of the teaching is focused on didactic teaching, with limited improvement in clinical teaching methods. Large and alarming discrepancies have been reported in distribution of dental resources. A literature search did not reveal any specialized education in geriatric dentistry in China, though its population of elderly is large.

Brazil has 170 dental schools, offering 14,000 undergraduate (UG) seats/year. At the postgraduate level, there are nineteen recognized dental specialties. A certificate program in geriatric dentistry is being offered, producing 216 new specialists every eighteen months. The geriatric population comprises 8.6 percent of the total population (n=14.5 million), resulting in a geriatric dentistry specialist per elderly population ratio of 1:117,249. At the UG level, geriatric dentistry is not included in the curricula of most of the schools. In a questionnaire-based study conducted with 1,857 students from sixty-four dental courses in Brazil, 98 percent of students responded positively for need to include a geriatric component in the dental curriculum. Statistically significant differences were observed between teaching of geriatric dentistry and student preference, as well as their prospect of working with this population in the future.

Israel offers a three-year postgraduate diploma course in geriatric dentistry at the Hebrew University. It was started in 2001 with teaching only theory. Since 2003, teaching has included theory and practical training in both stationary and mobile clinics. Oral medicine (24 percent) and oral rehabilitation (24 percent) receive the most teaching hours, while endodontics receives the least (4 percent).

India is the second most populous country in the world, with 1.04 billion people. Its elderly population at present is 7.7 percent of the total population, which in actual numbers is more than 77 million elderly. Geriatrics is one of the most recent and the least developed specialties of medical sciences in India. Geriatric medicine is in its infancy, and geriatric dentistry is almost non-existent. India has the highest number of dental schools in the world; at present there are 270 dental schools in the country, producing about 20,000 graduates and approximately 1,500 to 1,600 postgraduate dental surgeons every year. The graduate course in dentistry, the Bachelor of Dental Surgery (B.D.S.), is of five years’ duration. In all the subjects of undergraduate and postgraduate curricula, geriatric dentistry does not figure anywhere, except brief mention of age changes in dental and oral tissues. Students at both the undergraduate and postgraduate levels are trained to provide oral health care at the community level to residents in remote areas, including elderly patients, through a mobile dental van and dental camps. However, no training is given for oral care provision to patients in long-term care facilities or for the homebound elderly.

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**Challenges and Opportunities for Development of Geriatric Dentistry Education**

The first and the most important step required to promote geriatric dentistry education is to change the mind-sets of academicians, students, community members, and policymakers. Unless the importance of geriatric dentistry is realized and incorporated into dental curricula in predoctoral, postdoctoral, and continuing dental education programs, no headway can be made.

Geriatric dentistry is a multidisciplinary specialty, and therefore there are reservations regarding
its ability to develop as a separate discipline. But, like pediatric dentistry, it can also be developed as a specialized branch of dentistry. Teaching of geriatric dentistry needs to start from the first year of the dental curriculum and be included in all the subsequent years. As stated by Nitschke et al., gerodontology does not compete with other traditional specialties but only complements them. They have identified eleven domains in which geriatric dentistry was included in various basic sciences and clinical subjects of dentistry after analysis of the undergraduate curriculum in Germany, Austria, and Switzerland. This can provide the starting point to develop a curriculum for various categories of courses in geriatric dentistry.

Competencies required of a geriatric dentist need to be defined, and the appropriate teaching and learning methods need to be carefully chosen to train the geriatric dentist of the future. Besides knowledge and clinical skills required of a general dentist, a geriatric dentist needs to have a caring attitude, expertise in behavioral management, and additional knowledge of medicine and pharmacology to understand chronic illnesses of old age, their pharmacotherapy, adverse drug reactions, and drug interactions. To restore the often-mutilated dentition of elderly persons, advanced knowledge and skills are required in restorative dentistry, prosthodontics, and implant-supported rehabilitation. At the other end of high-skilled technical competence, community-based health promotion and disease prevention and care delivery to homebound elderly and those in long-term care facilities and nursing homes are equally important for training in geriatric dentistry to understand and manage complexities involved in the treatment of elderly patients.

Limited financial resources and lack of trained professionals are the main barriers to start geriatric dentistry in developing countries, including in India. The health budget is very low in developing countries. Of this, oral health has to compete with other serious communicable and noncommunicable diseases. Even within the oral health budget, oral health of children receives priority, as it is argued to have long-term benefits. It is perceived that the oral health of the elderly does not require as much attention, as they have already enjoyed the benefits of care in their earlier years.

Information and communication technologies can be used extensively to start newer courses in geriatric dentistry. Interactive multimedia, computer-assisted learning (CAL), virtual classrooms, video conferencing, and the Internet are powerful tools that can be used to initiate short-term courses in geriatric dentistry. The developed nations can stimulate the growth of this discipline in the developing world by sharing resources and expertise at either no cost or at a very low cost.

A multipronged approach is required to establish education in geriatric dentistry. Some of the measures that can be taken are as follows:

- **Sensitization of students during their predoctoral education.** All preclinical and clinical subjects should gradually introduce the subject to the students. Teaching-learning of geriatric dentistry at the predoctoral level could be more effective if it is accompanied by matching assessment strategies. It is known that assessment drives learning. Students study more thoughtfully when they anticipate its evaluation in the form of a structured assessment format. Training at the undergraduate level would improve future enrollment for diploma and certificate courses in geriatric dentistry, with the net effect of improved oral health care delivery to the elderly patients.

- **Postgraduate diploma/certificate courses.** Since at present, there is a dearth of trained faculty in the specialty, e-learning and distance learning may be a solution. In this venture, there is a vast potential for utilizing international expertise and developing collaborations with universities, where these programs are well established. During the course, there can be student/faculty exchange of short duration for personal interaction, guided outreach clinical training in long-term care facilities, oral care of homebound elderly, and training of care providers. Until such time that linkages are established and e-learning courses are developed, the existing faculty (with few years of clinical experience in managing geriatric cases), from clinical subjects like prosthodontics, endodontics, periodontics, and community dentistry may be utilized to teach geriatric dentistry in their respective fields of specialization. Similarly, medical faculty can teach basic science subjects of physiology, pathology, and genetic aspects pertaining to aging.

- **Continuing dental education.** This mode of training for professional development of interested dental surgeons, hygienists, dental nurses, and chair-side assistants can be an effective tool to improve oral health care delivery to the elderly patients.
The course content, duration, teaching, learning, and assessment methods needed to be designed for each of these three activities call for active collaboration among the stakeholders.

REFERENCES


