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Objectives: Do contemporary educational interventions based on general practice change doctors' behavior, and improve patient outcomes? It has become a more critical concern for governments and patients as well as dental practitioners. As reaccreditation and quality assurance scientific programs have become more widespread, the effectiveness of continuing dental education in changing clinical practice has come under closer inspection. There is a definite need to focus on the role of CDE during the COVID-19 Pandemic and how to implement CDE programs related to awareness of COVID-19.

Results: In this review, we intend to describe various methods of educating dentists that improve patient outcomes, to examine the effectiveness of continuing dental education in clinical practice in particular, and some key points for ensuring success. Specifically, we focused on the role of CDE in the prevention and control of the COVID-19 Pandemic and various education methods that were efficient in attaining knowledge, attitude, and practical skills during the COVID-19 era.

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Continuing Dental Education [CDE] and its Role during COVID 19 Pandemic

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Conclusions: Many educational methods, along with CDE, are essential to meet the diverse treatment needs at present and in the future. In particular, CDE programs related to the awareness of COVID-19 are essential for the better control and prevention of it. During this COVID-19 era, it is mandatory to adapt to the new paradigm shift in continuing education towards e-learning and meet the academic needs in terms of procuring knowledge, attitude, and skills.

I. Introduction

In the ever-changing field of the dental health profession, continuing dental health education programs must be adaptable and forward-thinking. One organization member in a professional school referred to continuing education as "shouting out of the windows."[1] Continuing Dental Education [CDE] are activities to improve dentist knowledge, attitudes, and skills, to keep them current with the latest advances that increase patient-care processes and outcomes, to help them accept or reject advanced practices, and persuade them to abandon the use of existing care of lesser effectiveness.[2]

The movement to increase coordination among health professionals to improve oral health care outcomes is a significant priority for all health professions. Complex dental issues frequently seen in patients can best discuss inter-professional health care teams through a multisectoral approach.[3]

The recent outbreak of the COVID-19 pandemic has a community spread pattern and is highly infectious. As the virus is new, the knowledge regarding the COVID-19 among dental professionals is less. Also, because of the nature of the treatments performed, i.e., aerosol-generating procedures, dental professionals are at increased possibility of exposure to the COVID-19.

The purpose of this literature review is to present specific CDE techniques on physician -care processes, improvements of patient health outcomes, and to address the clinical implications of CDE programs during the COVID-19 pandemic. And almost none reviewed all CDE techniques and compared estimates of benefits in the field of dentistry.

II. Traditional Continuing Education Programs

It is a time-based system of credits awarded for attending conferences, workshops, or lectures. The activities are typically teacher-initiated, using passive educational models [lecture]. Recent studies suggest that health care professionals benefit from reflection on the progress and development of their next learning projects or questions. Dentists should consider the perspective of CDE consisting solely of lectures, grand rounds, or dental staff meetings. They should engage in educational projects that offer unique involvement in thinking about professional practice and identifying learning needs. [4]

To achieve its greatest potential, CDE must be indeed continuing, not casual, sporadic, or opportunistic. Dentists must recognize the ongoing opportunities to generate essential questions, interpret new knowledge, and judge how to apply it in clinical settings. Essentially, this means that CDE must be self-directed by the dentist, including the supervision of the content and context for training. In turn, the opportunities for self-directed learning must improve the knowledge and skills needed for critical reflection on practice and measurement of improvement. [5]

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a) International Accreditation Standards

Incorporation of research into dental education is very imperative for the growth of the dental career, and even though the accreditation principles in the USA and Canada and administrations such as the National Institute of Dental and Craniofacial Research offer the students with chances for research, their involvement in research organizations appears very inadequate.[6] The disputes with the present curriculum of dentistry enlisted by the National Academy of Sciences, USA, are as follows:[7]

- Basic science ideas being insipidly related to clinical education.
- The core curriculum is not adequately in equivalence with contemporary dental science and practice.
- Dentistry and medicine are poorly accompanying.
- The dental curriculum being overloaded hence does not permit scope for increasing innovative thinking skills.

In Pakistan, the CDE has extensive stretching skills essential to practice high-quality health care. According to the Pakistan Medical and Dental Council, precise standards and strategies were established to renew a license to practice dentistry. According to which, license to practice is specified to dental practitioners who underwent a CDE training for five credit hours in a year (for the general dentist) and ten credit hours (for specialists).[8]

In 2014, the Dubai Health Authority (DHA) was contented to present the CDE strategies, which epitomize a landmark to gratifying the DHA intentional objective, which is to "ensure quality, stability, and availability of health care specialists."

According to the DHA, the strategy guidelines include the following:

a. Benefits to the patient

- Patients accept safe, high quality, and evidence-based service.

b. Benefits to the dental professional

- Improve confidence in the distribution of professional care and service
- Endorses and preserve the capability to practice
- Improves contentment with work role
- Affords structure and provision for the health care professional and his or her esteemed goals
- Enriches career chances. [9]

Ucer et al. [10] inspected the present developments and grade of CDE in implant dentistry (ID) in Europe. In the utmost European nations, earlier surveys had revealed that recently graduated dentists do not get satisfactory theoretical information, particularly the clinical skills in ID through their undergraduate education. Therefore, they must obtain knowledge and improve capabilities through additional postgraduate learning. Despite the consciousness of several drawbacks and the variations needed in the current core curriculum, there exist frequent encounters in its execution, such as conservatism of the faculty and economic limitations related to the execution of the variations. The American Dental Education hurled the Instruction on Change and Innovation in Dental Education with the persistence of fetching about pioneering variations in the education of general dentists and has suggested some important doctrines such as critical thinking, enduring education, and incorporation of knowledge from research into the core curriculum.[11]

b) Various methods of educating dentists in CDE

They can be face-to-face or at a distance, and educators can be human or devices such as computers.[12] The most regularly used techniques generally were found to have the least benefit, and they must be changed.[2]

Education Methods for CDE

- *Didactic programs:.[*2,5].[13-15], *Information only*[2]
- *Clinical practice guidelines:*[2]
- *Interactive education:*[1,2] Effect of interactive programs in changing physician care is moderate to high.[13-15]
- *Audit and feedback:*[1,2] Changes in the clinical behavior can be measured with chart audit with feedback.[16-18]
- *Academic (counter-) detailing/ outreach:*[2]
- *Reminders:*.[1,2]

Frequent Knowledge explosion by attending CDE accelerates the half-life of information. A dentist should attend CDE as it maintains the professional competence, which will lead to an increased inter-sectoral exchange of knowledge and improves treatment quality.

Multifaceted policies: There are various means and methods to translate new knowledge into practice. They are available at two levels, and they are the health system and individual dentist levels. The remaining issue is organization and implementation by educators, funders, and dentists. Multifaceted policies are required for such complex policy organization, development, and implementation.[2]

There must be parallel awareness first that no single approach to professional education works best under all circumstances.[19]

Successful implementation also requires awareness of local healthcare organization needs, evidence of suboptimal use of effective care, and good estimates of costs of changing behavior.[20,21]

c) Recertification and reaccreditation

The primary purpose of continuing dental education is to maintain and improve clinical

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performance. Recertification and reaccreditation are part of an international trend to shift the purpose of continuing dental education towards assuring adequate performance.[22]

The most effective methods derived include learning linked to dental clinical practice, interactive educational conferences, outreach events, and policies that include compound educational interventions (for example, outreach plus reminders): less effective approaches comprise audit, feedback, local agreement procedures the inspiration of judgment front-runners. The least effective approaches are also the most commonly used in general dental practice continuing dental education—namely, lecture format teaching and free printed material (including clinical guidelines).[2]

d) Role of Continuing Dental Education and Quality Assurance Programs

In discussing the potential impact of CDE, it is essential to address the crucial elements of the CDE program under consideration. Most of the CDE elements in this aspect include [23]Grand rounds-style lectures, Handouts, Self-assessment examinations for CDE credit, Telephone "hotlines" for authoritative consultation at no cost [2], and Wallet-size quick reference cards for dentists. Traditional CDE has not been associated with actual data based on local performance or with the knowledge by dentists that their subsequent practice patterns would continue to be monitored and compared with national standards. Stone et al. concluded economic incentives were the best motivator of patient behavior change, reminders were moderately useful, and information alone did not affect.[3]

e) Combination of educational interventions

Compounds of educational interventions were found to be better than single interventions. Organizational and management support were important additional factors in changing behavior. Peer review and group learning models were proposed as particularly relevant in general dental practice settings.[5]Combining techniques, for example, interactive education plus academic detailing, leads to an even greater effect than either achieves alone. [24,25]

f) Methods to implement in CDE in the future

- Team approach: There must be parallel awareness first that no single approach to professional education works best under all circumstances. Educators must use a collaborative team approach. i.e.., strategies that focus on teams and organizations, including unique practitioner social, political, and economic environments.[3] Clear models endure that can improve the likelihood of successful integration of evidence-based new practical clinical knowledge into clinical dental practice.[3]
- Implementation of Individual training sessions and educational activities such as rounds, educational meetings, dental conferences, refresher courses, programs seminars, workshops, lectures on the latest research methodology for human dental health care improvements in every aspect and symposia on trending technology should be taken into consideration in future.
- Consideration of lectures on research and research methodology at genetics and molecular levels will give a better contribution to the development of new advanced methods for the prevention and treatment of diseases by providing efficient dental care.
- Small group discussions on pediatric dental care that uses interactive techniques, videos, case studies will give the best impact on delivering an effective treatment and helps in the reinforcement of positive effect on both dentist performance and child oral health care.
- Computer-based instructional programs can be useful in propagating novel evidence and placing it in viewpoint for orthodontic health care professionals, as a minimum for those who are attentive in computer applications to their work.[26]
- Educational research suggests that dynamic graphics, or animation, can provide several advantages in a computer-based instructional lesson.[27]
- A fully organized, well-developed, and well-implemented continuing education workshop in leadership, mainly based on the latest techniques in leadership training, would have a positive effect on the skill, knowledge, and building up the self-confidence of dentists-managers. It is better to focus on developing leadership skills for the dental executive rather than providing information on practice management for the dental office staff in CDE programs. It is necessary to add postdoctoral leadership training programs in CDE to provide active leadership qualities that entail the dental executive a prospective leadership.[2]
- Patient-based interventions: Several patient-based educational interventions, especially those involving patient education materials, have been reported to be useful in implementing clinical practice guidelines concerning diabetes mellitus management[28], preventive strategies[29], and smoking cessation.[30]The essential skills required for success are collaboration, communication, professionalism. The ability to manage medically complex patients like diabetes mellitus[28], etc.. and behavior management of the medically compromised children is also a requirement. Evidence-based knowledge and skill, along with a

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multisectoral team approach, is a particular requirement in treating these patients.

- Faculty training and continuing education for clinicians, residents, and allied health providers will be necessary for the widespread adoption of a team-based collaborative care system to treat patients effectively.[3] It's essential to organize meetings with industrial representatives making new advances in technology and research and sharing new ideas with them to make things which help humanity to cure dreadful diseases.
- One more important requirement to be added to CDE is to make the upcoming dentist aware of oral diseases and basic knowledge of the etiology of any condition apart from normal, to give the perfect diagnosis, by using new advanced technology, skill, and knowledge.

g) Key features for success

- Valued members for transmitting the information to practitioners,
- Targeting group interests and motivations,
- Using collaborative teamwork which will give the best output,
- Tailoring interventions to audience needs, and
- Including peer and senior administration support.
- The robust implementation also requires awareness of local healthcare organization needs, evidence of the suboptimal use of efficient care, and sound estimates of costs of changing behavior.[23]

h) Role of CDE programs during COVID – 19 Pandemic

CDE programs should address the People at High Risk of Infection

World Health Organization (WHO) announced that the COVID-19 outbreak had established a health care disaster On January 30, 2020 [31]. According to Wang et al. 2020[32], existing interpretations recommend that individuals of all age groups are generally prone to this new epidemic infectious disease. However, those who are in close interaction with symptomatic and asymptomatic patients. Both the health care personnel and other patients in the hospital are at greater risk of SARS-CoV-2 contagion. Since February 14, 2020, an aggregate of 1,716 health care personnel in China was disease-ridden with SARS-CoV-2, entailing 3.8% affected individuals countrywide, 6 of that group who have deceased.

Recommendations for Dental Practice Interim management on infection prevention and control during health care were suggested when COVID-19 contagion was suspected.[33]Along with this, the interactive sessions on infection control, maintenance of various devices will improve knowledge among health care professionals, especially those who were involved in treating patients directly.[34] Poor hand hygiene among health care workers is a crucial reason for the spread of hospital infection. Compliance of the health care professional towards hand hygiene is determined by individual consciousness, which can be attained through recurrent throw reminders. [35]The use of Flipcharts is inexpensive, simple to use as an education tool. It can be used as an operational substitute for video-aids for delivering education regarding hand hygiene in the presence of an expert trainer.[36] According to a recent systematic review on the usage of PPE in Pakistan concluded the Usage of PPE differs about the need, operating surroundings, and category of healthcare associates. To defend against respirational infections, the widely used PPE were face masks and gloves. Overall, the PPE usage was less, lack of availability and reuse of it were identified. [37]Until now, there has been no covenant on the delivery of dental amenities through the epidemic of COVID-19. Based on our knowledge and appropriate strategies and research, CDE programs should guide the dentists to take strict personal protection measures and avoid or minimize operations that can produce droplets or aerosols.

Audiovisual aids which fulfill proper demonstrative procedures regarding the 4-handed technique and the use of saliva ejectors with low or high volume as these are beneficial for controlling infection and reduce the production of droplets and aerosols respectively[38-40] Endorsements for Dental Education-related contests for medical and dental schools, as well as their allied hospitals, are noteworthy. It was conveyed that an open message among students, clinical trainers, and managerial staff would improve common conviction and ease good collaboration.[41]

Based on our knowledge of SARS and pertinent extremely pathogenic transmissible disease, we provide a little essential recommendation for dental education during COVID-19: First; during this pandemic, online orations, case training, and problem-centered learning lectures should be implemented to evade redundant aggregation of persons and related risk of infection[42]. Current smart devices and applications have made it conceivable for students to attend and evaluate lectures whenever possible. Second, it is worth promoting to reassure students to involve in self-learning, make exclusive use of online assets, and acquire about the modern academic growths. Third, throughout this period, it is informal for students to be pretentious by disease-associated distress and pressure. Dental colleges should be organized to deliver psychological amenities to those who need them [43].

In the course of the COVID -19 Pandemic, the continuing dental education programs in China were conducted through various online platforms, and there was a considerable increase in their number during this pandemic.[44]Students have the opportunity to gain collective procurement of knowledge, skills, and attitudes by using the four-component instructional

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design model (4C/ID) model.[45]Its use in developing the various learning methods causes a paradigm shift towards tasks for learning from lectures.[46] By using this model in the continuing endodontic education, there was an increase in knowledge of the students and was operational in improving their practical skills.[47]So, it is suggested to use the 4C/ID model during the COVID -19 era for enhancing the communication skills and practical skills of students through distance education.

Entirely computer generated programs were not recommended. We can incorporate dental education by using manikin as an alternative to patient demonstrations during the pandemic. [48]The attitude, teaching skills of the faculty, and attitude of the end-users of the program in terms of advanced tools for e-learning determine the triumph of these programs.[49] Although the present education system in dentistry shows there are many difficulties in e-learning, [50] Authorities organizing CDE programs should give an additional academic score to the students in terms of merit for actively participating in these programs.

There is an immediate necessity to promote research-oriented CDE programs related to the spread of diseases via aerosols generated during various dental procedures. We must continuously address the infectious fears in CDE programs that may contest the current infection control schedule, particularly in dental practices and colleges of dental medicine.

i) Lessons practice

These are the few lessons for practice to the health care professionals involved in enlightening healthcare excellence.[51]

- Focus on the requirements for professional training and available resources
- Promoting an intellect of the community
- Proper usage of data in encouraging change in healthcare professionals' behavior.

III. Conclusion

Knowledge and healthiest practices in this field are continually changing. As new research and experience broaden our understanding, changes in research methods, professional techniques, or treatment may become necessary to be considered in CDE through a multi-sectorial approach. As evidence of the link between educational activities and improved patient care is necessary, CDE should create educational strategies for practicing dentists to improve clinical reasoning skills. Lifelong learning through CDE is essential for the dentist to maintain and increase competence in clinical practice. In particular, during the COVID-19 pandemic, it is imperative to educate the faculty and students through CDE programs regarding symptomology and diagnosis, possible transmission routes, following a standard personal protection barrier, infection control measures, maintenance of operating area and instruments, controlling stress due to fear of pandemic. Many educational options, along with CDE, are necessary to meet the diverse treatment needs at present and in the future.

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