



Primary care dentistry: Past, present and future.

Rand Hamad AlMujel¹, Alanood Abdulkarim Alzuhair², Amal Hamad AlShubeki³, Lamia Shafi ALDossari⁴, Seetah Alajmi⁵, Abrar Mohammed Aljanadi⁶, and Nouf Saud Almunaiseer⁷

- 1. Rand Hamad AlMujel:** General Dentistry, King Abdulaziz Medical City - National Guard Hospital, Riyadh
- 2. Alanood Abdulkarim Alzuhair:** Advanced General Dentistry (AGD), King Abdulaziz Medical City - National Guard Hospital, Riyadh
- 3. Amal Hamad AlShubeki:** Dental Hygienist, King Abdulaziz Medical City - National Guard Hospital, Riyadh
- 4. Lamia Shafi ALDossari:** Dental assistant, King Abdulaziz Medical City - National Guard Hospital, Riyadh
- 5. Seetah Alajmi:** Dental Hygienist, King Abdulaziz Medical City - National Guard Hospital, Riyadh
- 6. Abrar Mohammed Aljanadi:** Advanced General Dentistry (AGD), King Abdulaziz Medical City - National Guard Hospital, Riyadh
- 7. Nouf Saud Almunaiseer:** Restorative Dentistry, King Abdulaziz Medical City - National Guard Hospital, Riyadh

Abstract

Oral health is vital to overall well-being, yet dental diseases are among the most neglected chronic conditions. This paper examines the past, present and future of primary care dentistry. It provides a historical background of primary care dentistry and describes stages of its evolution. Historically, dentistry has transitioned from basic practices in ancient civilizations to a focus on preventive care and public health. In Saudi Arabia, primary care dentistry now employs a multidisciplinary team approach, emphasizing early disease detection and health promotion, supported by digital technologies and evidence-based practices.

Primary care dentistry: Past, present and future

The future of primary care dentistry is promising, with advancements like teledentistry and artificial intelligence set to enhance access, efficiency, and diagnostic capabilities. Despite these advancements, challenges such as workforce shortages and the need for better oral health practices persist. The alignment of these efforts with Saudi Vision 2030 highlights a commitment to improving healthcare quality and accessibility. Overall, primary care dentistry is on a transformative path, driven by technological innovations and a focus on preventive care, ultimately benefiting patients and the community.

Keywords: Dentistry, Primary care dentistry, public health, Developments, Future and Technology.

Introduction

Although oral health is an integral part of overall health, dental disease is one of the most neglected and prevalent chronic diseases. The prevalence of oral and dental diseases has been increasing [1].

Therefore, primary care dentistry, often referred to as general dentistry, is a primary care specialty that is unique among dental specialties in that it focuses not only on the oral and dental health of individuals but also addresses the needs of the community [2]. It is that part of dentistry that provides leadership and expertise in population-based dentistry, oral health monitoring, policy development, community disease prevention, and health promotion [2,3]. In recent decades, there has been a significant focus on the primary responsibility of health care professionals, including dentists, to promote the health of the public [4]. While most dentistry is provided by general practitioners, patients are sometimes referred to as specialists working in primary care or hospitals for advanced or specialized care. The success of these efforts requires that dentists adhere to an ethical public service stance [5,6]. Public health dentistry is given great importance as a specialty

Primary care dentistry: Past, present and future

in Saudi Arabia, as part of the Saudi Vision 2030 to advance the health sector and raise the level of health of individuals [7].

This paper will focus on primary care dentistry and will provide an overview of the past, present and future of primary care dentistry, and a proposed community health intervention to improve oral health, without claiming to be comprehensive.

Primary care dentistry – the past

Primary dentistry dates back thousands of years, with early dental practices emerging in civilizations such as the Mayans, Egyptians, Greeks, and Romans. Practices were limited to tooth extraction and pain management, and primitive tools such as dentures were used [8]. During the Middle Ages, barbers and general practitioners provided dental services without adequate training [9].

Dentistry developed into an independent branch of healthcare during the 16th&17th centuries, with innovations such as the discovery of anesthesia and the development of dental instruments, which contributed to the improvement of dental procedures [10].

In the current era, dentistry has witnessed an expansion of dental services, with a focus on preventive care and public health initiatives. This has contributed to enhancing the role of primary dentistry [11]. With the enhancement of collaboration between dental care providers and health care providers, especially with the advancement of digital technology, which has improved oral health outcomes [12].

Primary care dentistry – the present

Primary dentistry is an independent entity with a unique body of scientific knowledge applied in practice. This field provides programs and training courses that enhance the skills of clinicians, with a focus on providing multiple services to promote oral health and prevent disease [11].

Primary care dentistry: Past, present and future

In Saudi Arabia, the primary dental team, which includes dentists and dental care professionals (e.g., dental hygienists, dental therapists, clinical dental technicians and dental nurses), works alongside other clinicians to provide comprehensive services [13]. The main goals include promoting healthy habits, early detection of diseases, and providing necessary treatments such as examinations, fluoride treatments, and dental restorations [14].

Minimal intervention dentistry (MID) is a concept that aims to preserve healthy tooth structure and reduce damage [15]. This concept has evolved from our understanding of the process of tooth decay. The use of digital technology is also increasing in this field, as digital systems allow for better storage and analysis of information, which improves the patient's experience and enhances treatment outcomes.

Evidence-based practices help guide treatment according to real-world outcomes, making practice-based research in dentistry essential for the development of treatment methods and techniques [16].

Primary care dentistry – the future

The world is witnessing a huge technological revolution in all fields, including primary dentistry, which will continue to evolve with increasing technological developments [17]. Advanced digital technologies contribute to many major innovations that will enhance patient outcomes, reduce time and costs, and increase efficiency. Moreover, primary dentistry will witness a new era in oral health care through 3D printing technologies, intraoral scanning, and restorations using CAD-CAM technologies with standard hybrid materials [18]. In addition, the development of teledentistry, which emerged during the Covid-19 pandemic, has accelerated, which will contribute remotely to consultations and treatment planning, improving access for patients in peripheral areas. With the

Primary care dentistry: Past, present and future

advancement of communication technologies, teledentistry is likely to eliminate the gaps between rural and urban communities, providing cost-effective dental care [19].

Artificial intelligence will also revolutionize primary dentistry, due to its ability to analyze huge amounts of data, AI can enhance diagnoses, treatment planning, and clinical workflows [20]. Future applications may include AI-powered diagnostics, virtual treatment planning, and robotics that will become an integral part of dental practice. However, addressing challenges such as data privacy and ensuring unbiased algorithms will be essential to widespread adoption [21]. Overall, the integration of these technologies into core dentistry promises to improve clinical practice, patient experiences, and health outcomes, paving the way for a more efficient and equitable dental care system.

Evolution of the Primary care dentistry in Saudi Arabia: From Past to Future

The dental care system in Saudi Arabia has undergone a major transformation over the past decades, evolving from a focus on basic dental needs to the provision of comprehensive and specialized services. This evolution has been driven by various factors, including government initiatives, economic growth, and an increasing focus on healthcare education and promotion [22].

A key development in this transformation has been the integration of technology, particularly the adoption of EDR. This move towards digital transformation aims to enhance the efficiency and quality of dental services, although it has faced challenges such as staff resistance, lack of technical skills, and usability issues [23].

Another important aspect of the evolution of the system has been the increasing focus on providing dental care to individuals with special health needs. Efforts have been made to understand and address the barriers faced by these groups, including issues related to physical accessibility, affordability, and knowledge gaps among providers [24,25].

Primary care dentistry: Past, present and future

Amidst these developments, Vision 2030 stands out as a pivotal government initiative that aims to further revolutionize the healthcare sector, including dental care. The Saudi government launched Vision 2030 with the aim of diversifying the country's economy and improving the quality of life for its citizens by setting ambitious healthcare goals. These goals include expanding access to care, improving the quality of healthcare services, and promoting preventive health measures. The focus of Vision 2030 on healthcare innovation and technology integration is in line with ongoing efforts to modernize the dental healthcare system, promising a future where dental care is more accessible, efficient, and patient-centered. A study by Al-Thamiri highlights the role of Vision 2030 in targeting improvements in healthcare quality while maintaining cost effectiveness, underscoring its potential impact on the dental healthcare sector [26,27]. Despite these developments, the Saudi dental healthcare system continues to face challenges such as professional shortages, financial constraints, and high demand due to free services [28]. In addition, there is an urgent need to promote oral health, as practices such as regular brushing and flossing are not widely practiced among the population [29]. In summary, the evolution of the dental care system in Saudi Arabia reflects a journey towards modernization and inclusion, greatly influenced by Vision 2030. Significant progress has been made, but continued efforts are needed to overcome existing challenges and ensure the provision of effective and equitable oral health services to all populations.

Primary Care Dentistry Response to Pandemics and Emergencies

The healthcare system in Saudi Arabia, particularly in the dental sector, has demonstrated a commendable capacity to adapt and innovate in response to pandemics and emergencies, such as the COVID-19 crisis [7]. The implementation of teledentistry services during the pandemic is a prime example of this adaptability. Furthermore, the response to the pandemic in the dental sector also included a significant shift in health-

Primary care dentistry: Past, present and future

seeking behaviors [30]. During the initial phase of the COVID-19 pandemic, dental clinics in Saudi Arabia were recommended to close except for emergency dental care. This led to changes in the public's decisions to seek dental care. A 2022 study highlighted that while the use of teledentistry services among dental care seekers during COVID-19 was relatively low, the existing technological infrastructure in Saudi Arabia provided a solid foundation for these services. The study confirmed the potential of teledentistry in providing dental diagnosis, consultations, monitoring, and triage of both emergency and non-emergency dental cases during the pandemic [31]. The response of the Saudi dental healthcare system to the COVID-19 pandemic reflects its strength and resilience. Rapid adaptation to new modes of service delivery, such as teledentistry, and careful consideration of social determinants of health care-seeking behavior demonstrate a proactive, patient-centered approach. These efforts not only ensured continued access to essential dental services during a critical time, but also laid the foundation for future advances in dental care delivery in the face of emergencies [32].

Conclusions

Primary care dentistry has come a long way since its emergence as a distinct entity within dentistry. It is the first point of contact in the care process for most dental patients and aims to provide ongoing or longitudinal care with a health maintenance role that focuses on the individual rather than specific diseases or conditions. GPs working in primary care dentistry also play a gatekeeper and coordinator role regarding specialist services when referral to specialist primary care or dental hospital services is necessary. Although primary care dentistry has evolved greatly over the past 50 years with the introduction of new materials, concepts, techniques and technologies, it remains a developing field with a promising and exciting future, last but not least due to the many innovations and technological developments to come. However, a much-needed development is the

Primary care dentistry: Past, present and future

development of an evidence base in terms of ‘effectiveness’ studies that will raise the bar on prevention and treatment and help to strengthen the foundations of primary care dentistry for the benefit of patients, dental professionals and the wider community.

References

1. Peres, Marco A., et al. "Oral diseases: a global public health challenge." *The Lancet* 394.10194 (2019): 249-260.
2. Gallagher, Jennifer, et al. "Dental public health: connect, challenge and change." *Faculty Dental Journal* 12.2 (2021): 91-96.
3. Hugo, F. N., et al. "Role of dentistry in global health: challenges and research priorities." *Journal of Dental Research* 100.7 (2021): 681-685.
4. Mascarenhas, Ana Karina, Christopher Okunseri, and Bruce Dye, eds. *Burt and Eklund's Dentistry, Dental Practice, and the Community-E-Book: Burt and Eklund's Dentistry, Dental Practice, and the Community-E-Book*. Elsevier Health Sciences, 2020.
5. Stephens, Mark B., Joseph P. Wiedemer, and George M. Kushner. "Dental problems in primary care." *American family physician* 98.11 (2018): 654-660.
6. Dobrzański, Leszek A., et al. "The concept of sustainable development of modern dentistry." *Processes* 8.12 (2020): 1605.
7. Alkhamis, Abdulwahab, and Shaima Ali Miraj. "Access to health care in Saudi Arabia: development in the context of vision 2030." *Handbook of healthcare in the Arab world*. Cham: Springer International Publishing, 2021. 1629-1660.
8. Libal, Autumn. *Dental Care*. Simon and Schuster, 2014.
9. Fejerskov, Ole, Sergio Uribe, and Rodrigo J. Mariño. "Dentistry in a Historical Perspective and a Likely Future of the Profession." *Career paths in oral health* (2018): 3-19.
10. Jandt, Klaus D., and David C. Watts. "Nanotechnology in dentistry: Present and future perspectives on dental nanomaterials." *Dental Materials* 36.11 (2020): 1365-1378.
11. Harnagea, Hermina, et al. "Barriers and facilitators in the integration of oral health into primary care: a scoping review." *BMJ open* 7.9 (2017): e016078.
12. Rekow, E. Dianne. "Digital dentistry: The new state of the art—Is it disruptive or destructive?." *Dental Materials* 36.1 (2020): 9-24.

Primary care dentistry: Past, present and future

13. Alshahrani, Abdullah M., and Syed Ahmed Raheel. "Health-care system and accessibility of dental services in Kingdom of Saudi Arabia: an update." *Journal of International Oral Health* 8.8 (2016): 883-887.
14. Siddiqui, Ammar Ahmed, et al. "Oral health in Saudi Arabia." *Handbook of Healthcare in the Arab World* (2021): 3511-3536.
15. Leal, Soraya Coelho, et al. "Minimum intervention oral care: defining the future of caries management." *Brazilian oral research* 36 (2022): e135.
16. White, Joel M., et al. "Tracking oral health in a standardized, evidence-based, prevention-focused dental care system." *Journal of public health dentistry* 80 (2020): S35-S43.
17. Ellner, Andrew L., and Russell S. Phillips. "The coming primary care revolution." *Journal of general internal medicine* 32 (2017): 380-386.
18. Bhushan, Jagat, and Vishakha Grover. "Additive manufacturing: Current concepts, methods, and applications in oral health care." *Biomanufacturing* (2019): 103-122.
19. Alotaibi, Sarah, and Ahlam Alshehri. "Teledentistry approaches for dental assessments and consultation during the COVID-19 pandemic." *Smart Homecare Technology and TeleHealth* (2022): 11-25.
20. Carrillo-Perez, Francisco, et al. "Applications of artificial intelligence in dentistry: A comprehensive review." *Journal of Esthetic and Restorative Dentistry* 34.1 (2022): 259-280.
21. Rossi, Luca. "AI-Driven Optimization of Dental Practice Operations." *Orthodontics Unveiled: Exploring Emerging Trends in Dental Alignment* (2021): 32.
22. Al-Hashem, Anwar. "Health education in Saudi Arabia: historical overview." *Sultan Qaboos University Medical Journal* 16.3 (2016): e286.
23. Almaiman, Ahmad, et al. "Electronic dental record (EDR) use in Saudi Arabia: an exploratory study." *Integrating Information Technology and Management for Quality of Care*. IOS Press, 2014. 169-172.
24. Alfaraj, Amal, et al. "Barriers to dental care in individuals with special healthcare needs in Qatif, Saudi Arabia: a caregiver's perspective." *Patient preference and adherence* (2021): 69-76..
25. AlHammad, Kholood A. Sanad, et al. "Challenges of autism spectrum disorders families towards oral health care in Kingdom of Saudi Arabia." *Pesquisa Brasileira em Odontopediatria e Clínica Integrada* 20 (2020): e5178.

Primary care dentistry: Past, present and future

26. Health sector transformation program. [Feb;2022]. 2023. <http://www.vision2030.gov.sa/en/vision-2030/vrp/health-sector-transformation-program/>
27. Althumairy, Riyadh I. "Exploring the quality of life for Saudi patients utilizing dental healthcare services: a systematic review." *Journal of Multidisciplinary Healthcare* (2022): 309-315.
28. Asmri, Mushabab Al, et al. "The public health care system and primary care services in Saudi Arabia: a system in transition." *Eastern Mediterranean Health Journal* 26.4 (2020): 468-476.
29. El Bcheraoui, Charbel, et al. "Use of dental clinics and oral hygiene practices in the Kingdom of Saudi Arabia, 2013." *International dental journal* 66.2 (2016): 99-104.
30. Bastani, Peivand, et al. "Factors influencing access and utilization of health services among older people during the COVID– 19 pandemic: a scoping review." *Archives of Public Health* 79 (2021): 1-11.
31. Bugis, Bussma A. "Patients self-reporting of utilizing teledental services during the COVID-19 pandemic in Saudi Arabia." *Journal of Patient Experience* 9 (2022): 23743735221112209.
32. Ammar, Nour, et al. "Behavior change due to COVID-19 among dental academics— The theory of planned behavior: Stresses, worries, training, and pandemic severity." *PloS one* 15.9 (2020): e0239961.