Acta Scientific Dental Sciences

Volume 10 Issue 12 December 2026

Review Article

Professionalism in Dentistry: Concepts, Principles, Challenges and Future Directions—A Narrative Review

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DOI: 10.31080/ASDS.2026.10.2163

Received: October 23, 2026

Published: November 18, 2026

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Abstract

Professionalism is a fundamental component of dental practice, integrating ethical conduct, clinical competence, accountability, integrity, empathy, and a commitment to patient welfare. This review explores the concepts and principles of professionalism in dentistry, highlighting its significance in building patient trust, ensuring quality care, and maintaining public confidence in the dental profession. It discusses the essential attributes of a dental professional, the role of professional education and assessment, and the importance of lifelong learning, communication, teamwork, and reflective practice. Contemporary challenges, including the commercialisation of dental care, professional burnout, the influence of artificial intelligence, the hidden curriculum, generational differences, and the use of social media, are examined in the context of changing professional expectations. The review also considers future directions, emphasising the integration of professionalism into dental curricula, effective role modelling, continuous professional development, and the responsible adoption of emerging technologies. Sustaining professionalism requires a balance between scientific advancement, ethical responsibility, and compassionate, patient-centred care. Strengthening professional values throughout dental education and practice is essential for preparing dentists who are competent, accountable, and responsive to the evolving needs of society.

Keywords: Professionalism; Dental Education; Professional Ethics; Patient-Centred Care; Artificial Intelligence; Integrity and Honesty; Altruism and Commitment to Patient Welfare; Competence and Lifelong Learning; Professional Knowledge and Skills; Communication Skills

Introduction

A profession is a specialised occupation that requires advanced education and training. It is governed by standards, codes of conduct, and regulatory bodies that establish ethical and technical guidelines for practitioners. A profession also carries a commitment to serving society or a specific client group [1]. Medicine, dentistry, law, engineering, teaching, and accounting are examples of professions. A professional is a person who works within a profession and adheres to its standards and requirements. Society recognises professionals for their knowledge, skills, commitment to ethical standards, integrity, and trustworthiness.

Professionalism is the attitude, set of behaviours, and standards demonstrated by someone working in a particular field. It encompasses ethical behaviour, integrity, accountability, reliability, and respect for others. Accepted characteristics of a professional include effective communication, punctuality, ethical decision-making, and respect for clients and colleagues. Professionals are also committed to continuous improvement, keeping their knowledge up to date, and refining their skills.

Profession vs. professionalism

Any recognised career may be considered a profession, whereas professionalism refers to the quality with which a person carries out that work, including their attitude and competence. A profession is established through education, qualifications, and licensing, whereas professionalism develops through continuous practice, emotional maturity, and appropriate workplace behaviour. After obtaining a degree from the relevant university and registration with the appropriate council, a person can practise dentistry. A dentist demonstrates professionalism by examining the patient, obtaining relevant information through effective communication, making an accurate diagnosis through appropriate investigations, providing suitable treatment, and following up with the patient until the treatment is completed and the patient's condition has improved. Professionalism can be viewed through a five-point scale: Polite, Personal, Present, Performance, and Polish.

- Polite – Treating everyone with kindness and respect, from entry-level staff to executive leadership, and maintaining this behaviour consistently.
- Personal – Remembering the names of staff and patients, listening actively, and understanding their needs.
- Present – Arriving on time for work and minimising distractions, such as mobile phones.
- Performance – Consistently delivering high-quality work.
- Polish – Maintaining a neat, clean, and appropriate appearance that suits the workplace environment.

Evolution of professionalism

Professionalism as a concept has undergone major changes over the millennia, particularly during the last two decades. Medical and dental curricula have changed considerably in both content and application, while training programmes have become increasingly evidence-based and professionalism has become an integral part of assessment. Sociologists define a profession as a vocation with a body of knowledge and skills (expertise) that is placed in service of others and for the welfare of society. This definition has established healthcare as an epitome of professionalism [2,3].

The foundation of professionalism in medicine rests on three pillars: expertise, ethics, and service. Society grants doctors professional autonomy on the understanding that these professionals will safeguard individual patient and societal welfare above their own interests. Autonomy is self-regulated through a code of ethics, as well as through laws and statutory frameworks that establish guidelines, regulations, and licensing requirements. However, no regulatory system can substitute for the standards of professionalism demonstrated by health professionals [4-6].

The word 'profess' was first used in a book of prescriptions written by Scribonius, a physician and pharmacist at the court of the Roman emperor Claudius. Scribonius lived between 1 and 50 AD. He associated 'profession' with humanism, which was linked to virtues such as compassion, mercy, and competence. Between 1175 and 1225, the word 'professio' became associated with the concept of taking an oath. The Oxford English Dictionary has proposed the following working definition for medical educators: 'Profession: An occupation whose core element is work based upon the mastery of a complex body of knowledge and skills. It is a vocation in which knowledge of some department of science or learning or the practice of an art founded upon it is used in the service of others. Its members are governed by codes of ethics and profess a commitment to competence, integrity and morality, altruism, and the promotion of the public good within their domain. These commitments form

the basis of a social contract between a profession and society, which in return grants the profession a monopoly over the use of its knowledge base, the right to considerable autonomy in practice and the privilege of self-regulation. Professions and their members are accountable to those served and to society'.

In the modern context, many synonyms for the word profession have developed, including occupation, specialisation, qualification, and paid employment. In ancient societies, there were three classic professions: theology, law, and medicine [7].

According to Chamber's English Dictionary (1990), the word 'profession' connotes the act of professing; an open declaration; an avowal; a pretence; an employment that is not mechanical and requires some degree of learning and skill; habitual employment; the collective body of persons engaged in any profession; religious belief; entrance into a religious order; and the vow then taken.

Since the definition of a profession initially lacked precision and clarity, Abraham Flexner formulated six criteria for a profession in 1915:

- They involve essentially intellectual operation.
- They draw their raw material from science and learning.
- They work up this material to a practical and definite end.
- They possess an educationally communicable technique.
- They tend towards self-organization.
- They are becoming increasingly altruistic in nature [8].

In 1956, Liberman added two more criteria to this list:

- A broad range of autonomy for both individual practitioners and the occupational group as a whole; and
- An acceptance by practitioners of broad personal responsibility for judgments made and acts performed within the scope of professional autonomy [9].

Oath of Charaka (Charaka Sapadh)

Sage Charaka, the ancient Indian physician, admitted students after they had completed sixteen years of age. They were expected to have a general education in religion, philosophy, literature, astronomy, astrology, mathematics, technology, and plant sciences. Students were required to have a contented frame of mind, be well mannered, and be highly intelligent. They were first evaluated by a group of scholars known as 'Dwara pundits', and successful students were provisionally admitted. They then underwent a twelve-month probationary period, after which only one fifth were successful in gaining admission. The students were then initiated before the sacred fire, and the guru instructed them in the basic behaviour expected of a medical student. During the time of Charaka (2nd century BC–1st century AD), the qualities expected of a medical professional were clearly identified. A detailed account can be found in Chapter 8, Vimana Sthana, of the 'Charaka Samhita'. Some important statements were as follows:

- Observe celibacy (brahmacharya).
- Always speak the truth.
- Follow a vegetarian diet.
- Choose food that promotes intellect and mental health.
- Refrain from jealousy.
- Do not carry weapons.
- Always obey the instructions of the preceptor.
- Act without ego.
- Act with utmost care and affection.
- Avoid finding fault with wise and learned persons.
- Make every sincere effort to cure patients.
- Never cheat or mistreat patients merely to make a comfortable living.
- Do not even think of committing adultery or aspire to acquire property belonging to others.
- Maintain an appearance and dress that make the student look modest and noble.
- Always strive to improve knowledge and adopt methods that promote good health.
- Do not treat women in the absence of their husbands or guardians. Women should not be treated without their consent.
- When entering a patient's residence, ensure that you are well dressed and keep your head bowed.
- Do not disclose the customs, practices, or secrets of a patient's family to outsiders.

- After determining that a patient's life span is decreasing, that the patient is close to death, and that the disease has a poor prognosis, do not disclose this information to the patient or the patient's family if you suspect that it might cause shock or grief [10].

Bushido: The soul of Japan

Bushido: The Soul of Japan is a samurai moral code concerning the attitudes, behaviour, and lifestyle of warriors, written by Inazo Nitobe. It describes moral guidelines that have been handed down over centuries by sages and samurai.

It was first published in 1899 and describes, among other values, "benevolence", "honour", "loyalty", and "self-control". Traditionally, the concept of medical professionalism has been closely intertwined with the values of the society in which doctors practise [11,12].

The core virtues and principles of bushido

- **Gi (Rectitude/Justice):** Making the right decisions with complete honesty and following a strict sense of fairness and reason.
- **Yu (Courage/Bravery):** Standing up for what is right and facing fear, danger, or death with calm strength rather than reckless aggression.
- **Jin (Benevolence/Compassion):** Using power and strength to help others, show mercy, and practise universal love.
- **Rei (Respect/Courtesy):** Showing proper manners, politeness, and dignity to everyone, including adversaries.
- **Makoto (Honesty/Sincerity):** Ensuring that words and actions are consistent; speaking the truth without pretence.
- **Meiyo (Honor):** Maintaining personal dignity, self-worth, and a high ethical standard by being the true judge of one's own character.
- **Chugi (Loyalty/Duty):** Remaining deeply faithful, devoted, and responsible to those you serve and protect [13].

Professionalism in modern times

Modern professionalism continues to maintain public trust through ethical conduct, respect for patient dignity, and clear communication, while navigating the increasing shift towards institutional employment and commercial pressures. Ethical standards must be upheld, patient confidentiality must be protected, and every individual must be treated with respect. Communication with patients should demonstrate empathy. Doctors should listen carefully to patients' concerns, explain their condition clearly, and give due consideration to cultural sensitivity. Systemic and oral health problems can be addressed effectively through interprofessional collaboration. Working as part of a team is an essential quality for contemporary healthcare professionals. Commercial pressures are common, and professionals must learn to navigate them through careful and ethically informed discussions. There is also a shift in the working model, requiring doctors to adapt to corporate or organisational employment settings while continuing to uphold ethical principles.

The term 'conflict of interest' began to influence professional discussions during the 1960s and 1970s. A conflict develops between altruism and self-interest when a healthcare provider's personal or financial goals conflict with the professional duty to put the patient first [14]. This may eventually lead to an emphasis on remuneration, abuse of power, lack of conscientiousness, failure of self-regulation, and escalating healthcare costs.

The primary duty of a doctor is to protect the patient's health, ensure safe treatment, and conduct research honestly. Personal benefits, additional money, gifts, promotions, and other favours are considered secondary interests. When secondary interests introduce bias into a doctor's primary professional responsibilities, this is considered as a conflict of interest [15].

Over the years, the status of doctors has eroded considerably. Doctors, once regarded as heroes or kings, have fallen from the pedestal of public adulation. William Osler reminded the medical community that "the practice of medicine is not a business, and never can be one. Our fellow creatures cannot be dealt with like a man deals with corn and coal". Consumerism and commercialism, once considered alien to the healthcare profession, are now discussed openly. However, professionals are cautioned against accepting expensive gifts, travel perks, and financial assistance from medical companies. Referring patients to a laboratory, clinic, or pharmacy that a doctor owns or from which the doctor benefits financially, when such services are not clinically necessary, should be considered unethical. Another area requiring caution is the use of biased data in research funded by a corporate sponsor. Decisions driven by the pursuit of personal fame, awards, or career advancement should, as far as possible, be avoided [16].

The major impact of commercialism on professionalism is the erosion of trust. When doctors or hospitals prioritise financial returns, patients may perceive medical advice as profit-driven rather than exclusively therapeutic, thereby weakening the traditional ethical relationship between the profession and society. Commercialism can compromise patient care through the overprescription of branded medicines and the promotion of elective and cosmetic procedures based on market pressures rather than clinical necessity. Patient interests must take priority over commercial pressures such as institutional quotas and corporate revenue goals. Healthcare marketing and advertising can also inflate perceptions of clinical effectiveness and distort patient choices. The definition of professionalism in modern times should be clarified in this context.

The rise of corporate chains, online clinics, and rapid transactional encounters can make healthcare feel like an assembly line, reducing continuity in the trusting doctor–patient relationship. Ultimately, the cost of treatment may become unaffordable for the general population [17].

Core attributes of dental professionalism

- Integrity and honesty
- Altruism and commitment to patient welfare
- Competence and lifelong learning
- Professional knowledge and skills
- Communication skills
- Empathy and compassion
- Confidentiality and respect for privacy
- Positive attitude, approachability, responsiveness
- Reliability and responsibility
- Ethical behaviour

Integrity and honesty

Integrity is often described as doing the right thing even when no one is watching. It is quality of being truthful, sincere and morally upright. A person with integrity does not cheat, lie or misuse their power for personal gain. Integrity builds credibility. People trust those who are honest and transparent. Integrity ensures fairness, justice and accountability. Without integrity there can be no trust or respect [18,19].

Honesty and integrity form the foundational core of the doctor-patient relationship and ethical practice in both medicine and dentistry. Patient should be provided with clear and truthful information of the treatment so that the patient can fix his choice. Patient records must be made truthfully, arrive at diagnosis accurately, provide details of the related financial transactions with clarity and communicate transparently with the patient. Only highly essential procedures need be recommended and commercial pressures need not hinder the decision making. No action should be undertaken by the dental professional that would erode the trust maintained between the health care provider and the society.

A true professional has the ability to work unsupervised and to certify the completion of the work. People who produce anything of economic value need supervision and that is the common characteristic prevailing in most work environments. A person who can work satisfactorily only under supervision cannot claim the status of a professional. He can only be an amateur. In fact, integrity precedes professional competence. A practising surgeon in the initial stages may not be very proficient but should be aware of the basic tenets of medical -practice and what constitute malpractice [20].

Altruism

The word 'altruism' originated with the French philosopher Auguste Comte as an antonym for 'egoism'. The word was derived from Italian and Latin meaning 'other people' or 'somebody else'. Altruism is more than just the ability to promote success in others; it is the concern for the welfare and/or happiness of other people above oneself. Interestingly, altruism occurs elsewhere in the animal kingdom, but primarily as a means of survival of an individual species.

Altruistic behaviour involves acting selflessly to help others without expecting a reward. The story of Lini Puthussery, 31 year old nurse who was working as a daily wage nurse in a Taluk hospital, in Kozhikode, Kerala, India (May 2018). She attended the initial patient of the Nipah virus outbreak in Kerala. The highly contagious and fatal nature of the virus was not yet fully understood by the staff. Sensing that she had contracted the incurable virus and was on her deathbed, Lini scribbled a final, emotional letter to her husband, who was working outside India. In it, she wrote: "I think I am almost on my way; I don't think I'll be able to meet you. Please look after our children".

To prevent the virus from spreading further, her body was cremated immediately by health officials with the consent of her family, meaning her loved ones—including her two young children aged two and five—never got a final glimpse of her.

The World Health Organization (WHO) paid a glowing global tribute to her selfless service. Posthumously. She was also honoured with India's prestigious National Florence Nightingale Award. Lini is one of the finest examples of altruism of a health professional [21].

The golden rule of altruism is to treat others the way you want others to treat you.

Competence and lifelong learning

True learning transcends the classroom and that prepares individuals not for passing examinations but for life. This kind of education is outlined in UNESCO's Four Pillars of Education, which was established in the Delors Report. The four pillars—Learning to Know, Learning to Do, Learning to Be, and Learning to Live Together—are the foundation principles that allow educational institutions to develop lifelong learners who are curious, self-assured, capable, and compassionate [22].

Learning to know means acquiring cognitive tools and thereby mastering knowledge. Learning to know encourages curiosity, critical thinking and lays the foundation for learning how to learn throughout life.

Learning to do is putting knowledge into practical profile and developing professional skills. Individuals will be prepared to adapt to changing workplace situations.

By learning to live together an individual develops social skills, empathy and understands the value of interdependence. Through this one can learn to resolve conflicts peacefully, basics of cooperation and develop respect for cultural diversity.

Learning to be means focusing on the holistic, all-around development of the individual. It also nurtures self-awareness, creativity, personal responsibility, and ethical values.

Habits of a lifelong learners

These are some characteristics of lifelong learners:

- They believe that knowledge and skills can grow through hard work and practice.
- They nurture curiosity and ask questions.
- They regularly read books, articles and other informative materials.
- They are interested in acquiring newer skills even if it is a difficult task.
- They consider failures as lessons to go forward and not as personal defeat
- They listen more than speaking.
- They share the knowledge with others and readily teaches.

Reading is the traditional way of learning but it has become less popular because of shorter attention spans. An average person can read 40 pages a day. The speed with text books and journals will be less. Education is not just about learning but it is about sharing what you have learned. Harry Gray (1919 – 2009), American business executive stated as follows: "I can give away everything I know, and it doesn't cost me a thing. If I had all the world's money and gave away $1, I'd have less. But if I gave away all the world's knowledge, I'd still have it all" [23].

Ethical behaviour

There are five cardinal principles that govern ethical behaviour:

- Patient autonomy – patient must be involved in the treatment decisions
- Nonmaleficence – do no harm to the patients. Provide the treatment within the limits of training.
- Beneficence – do good to the patients. Provide competent care based on evidence obtained from current research.
- Justice – treat the patients with fairness and without prejudice
- Veracity – Treat the patients with truthfulness, honesty and execute diagnosis and treatment planning [24].

Communication skills for the dental professional

- The four classic pathways of communication are: reading, writing, speaking and listening. Communication becomes more effective with the addition of non-verbal pathways.

- Dentist-patient communication is a bidirectional process involving the exchange of ideas that should be clear (easy to understand), correct (accurate), concise (to the point), complete (with essential information), and cohesive (well-organized). Effective communication empowers patients with the knowledge required to make an informed decision about their own oral health [25].
- **Facial expressions:** A warm smile can create an atmosphere that alleviate tension. Dental professionals should be mindful of how their expressions might be interpreted, ensuring that they are calm.
- **Eye contact:** Maintaining steady eye contact shows engagement, builds trust, and reassures the patient that their concerns are being taken seriously. Avoiding eye contact may give the impression of disinterest or lack of confidence.
- **Tone of voice:** A soft, calm voice can reduce patient anxiety. In contrast, a rushed or monotonous voice may convey stress, disinterest, or lack of empathy.
- **Body language:** Open, relaxed body language communicates comfort and confidence. Standing with crossed arms, sitting rigidly, or leaning too far away can create a psychological barrier between the clinician and the patient.
- **Gestures:** Subtle gestures, like nodding when listening, can affirm that the clinician understands the patient's concerns. On the other hand, abrupt or excessive gestures may signal impatience or frustration.
- **Space/proximity:** Maintaining an appropriate physical distance creates a comfortable environment. Standing too far may feel distant and disengaged, while being too close can invade personal space and increase anxiety.
- **Touch:** Gentle, reassuring touch, such as a light hand on the shoulder or arm, can provide comfort and reduce fear, particularly in nervous patients. However, clinicians must remain mindful of personal boundaries and preferences.
- **Pacing and timing:** The speed at which a dental professional move or speaks can convey a lot. Rushing through explanations or procedures can leave patients feeling anxious or overwhelmed, while a more measured pace fosters a sense of calm and control.
- **Active listening cues:** Nods, brief verbal affirmations (like 'I understand'), and other subtle gestures can signal active listening. These cues reassure the patient that their concerns are being heard and taken seriously.

Time management

Time is a river without banks that flows continuously. Otherwise, time is the one that has elapsed between two incidents. The characteristics of time are: it is inelastic (it cannot be stretched), it is finite (equal for all), it cannot be stored, there is no replacement for time and it is a very expensive item.

The common complaint of busy people is that 'I do not have time'. Where does it go? Your time is robbed by social media, internet, mobile, indecision, visitors, meetings, crisis management, procrastination, lack of prioritisation and over commitment.

Achievement in specified time is considered as success. If a person can complete the work in preplanned specified time, he is considered as the winner. If you cannot complete it on time, then you will fail. A professional should plan the goals well in advance and allocate time for each realistically. There are some useful management tools to control time. Prepare a to do list for planning, create a time diary to track where the time is lost and try to plug those areas. Interruptions, office socialising, unscheduled visitors and poor work environment are areas where particular attention has to be given to manage time. The best way to manage time are the following: 1.do not be lost in things you like most, 2.don't do things leisurely, 3.don't be unrealistic, 4.don't practise crisis management and 5.don't be managed by others. Always remember the parable of pencil: unless held by someone, it is not useful, to remain useful it has to be sharpened from time to time, what is seen outside is not so important and wherever you go leave your mark.

Time management should not be equated with performing procedures rapidly; rather, it involves using available time judiciously while maintaining clinical quality, patient safety, and professional standards. Evidence from dental education suggests that structured planning and preparation can improve students' confidence and readiness for clinical care, supporting the importance of developing these skills early in professional training [26,27].

Poor time management may contribute to missed deadlines, appointment overruns, increased workload, stress, fatigue, and reduced professional satisfaction. For dental professionals,

repeated delays may also adversely affect the patient experience and disrupt the functioning of the dental team. Effective strategies include preparing for appointments in advance, prioritizing tasks according to clinical urgency, allocating realistic time for different procedures, maintaining appropriate buffers within the schedule, delegating suitable tasks to trained team members, and periodically reviewing the efficiency of clinical workflows. Time management should be viewed as an ongoing professional skill that gets developed through experience, reflection, and deliberate practice [28,29].

Assessment of professionalism

Assessment of professionalism is an integral component of dental education. Unlike the assessment of clinical knowledge or technical skills, professionalism is a complex, multidimensional construct encompassing integrity, accountability, empathy, confidentiality, communication and commitment to lifelong learning. Its assessment is challenging because professional behaviour is context-dependent. Consequently, no single assessment method can adequately capture all its dimensions. A combination of methods, including direct observation of clinical encounters, workplace-based assessments, case-based discussions, peer assessment and patient feedback can provide a comprehensive understanding of a learner's professional development. The use of clearly defined behavioural criteria and structured assessment tools can improve consistency, transparency, and fairness to the assessment [30,31].

A longitudinal and formative approach is particularly valuable for assessing professionalism in dental education. Repeated observations across different clinical settings allow educators to identify consistent behavioural patterns rather than relying on isolated incidents or subjective impressions. Portfolios and reflective exercises encourage students to examine their decisions, recognise ethical dilemmas, and develop insight into their strengths and limitations. Assessment should be accompanied by timely, constructive feedback and opportunities for remediation, with the ultimate objective of fostering professional growth rather than merely assigning a grade. Institutions should also establish explicit standards, trained assessors, documented procedures, and mechanisms for addressing unprofessional behaviour [32].

There are several assessment tools to evaluate professionalism in medical and dental education. They include Mini clinical evaluation exercise (Mini-Cex), Professionalism mini evaluation exercise (P-Mex), Objective structured clinical examination (OSCE). A Mini-CEX is a brief, 10-to-20-minute direct observation of a trainee interacting with a real patient, followed by structured feedback from an assessor.

The Professionalism Mini-Evaluation Exercise (P-MEX) is a workplace-based assessment tool modelled after the Mini-CEX to evaluate medical professionalism in real-world clinical encounters. It consists of 24 directly observable items rated on a 4-point Likert scale (typically ranging from unacceptable to exemplary). It is completed by a faculty member or clinical supervisor observing a trainee during a routine clinical interaction. It takes roughly 10–15 minutes for the observation and immediate feedback session.

An Objective Structured Clinical Examination (OSCE) is a hands-on, practical test used in healthcare education to evaluate a student's clinical competence, communication, and procedural skills through a series of timed stations.

"A 41-year-old man has presented with severe back pain that started two days ago after lifting a heavy box. Please take a relevant history, suggest appropriate physical examinations, and briefly counsel the patient".

An actor playing the role of the standardized patient, sits on the examination table. An examiner sits quietly in the corner with a standardized grading checklist mark sheet.

Common types of OSCE stations are history taking, clinical examination, procedural skills, data interpretation, communication and ethics.

There is no consensus on the best methods for assessing professionalism. The abstract nature of professionalism, its broad scope and the complexity of personality traits make comprehensive assessments challenging.

Future research should validate new assessment techniques, explore innovative feedback systems, and ensure that professionalism is central to competency-based medical education [33].

Discussion and Conclusion

Commercialisation of dental practice

The increasing commercialisation of dental practice poses a significant challenge to the ethical foundations of professionalism. Although financial sustainability is essential for the effective functioning of dental clinics, excessive emphasis on profitability, revenue generation and market competition may conflict with professional obligations. Commercial pressures may encourage unnecessary investigations, overtreatment, aggressive marketing and the prioritisation of financial interests over patients' needs. The growing influence of corporate dentistry and the expansion of private dental services further highlight the importance of balancing business considerations with ethical responsibilities. As discussed by Holden., *et al*. tensions between commercial and professional obligations represent an important concern in contemporary dentistry. Maintaining professionalism requires evidence-based treatment planning, transparent communication regarding costs and available alternatives, respect for informed consent, and appropriate management of conflicts of interest [34].

Burnout and professional well-being

Burnout is an important occupational challenge that may adversely affect the maintenance of professional standards among dental practitioners. Long working hours, demanding clinical procedures, financial responsibilities and high patient expectations may contribute to emotional exhaustion, reduced professional engagement and a diminished sense of personal accomplishment. Burnout may also affect concentration, empathy and clinical decision-making, potentially compromising patient safety and quality of care. Dental students and early-career practitioners may be particularly vulnerable during periods of academic pressure, clinical transition and professional uncertainty. However, burnout should not be regarded solely as an individual's inability to cope with occupational demands; organisational culture, workload and the availability of professional support are also important considerations. Promoting professionalism therefore requires supportive working environments, reasonable workloads, access to mentoring and mental health resources, and a culture in which seeking assistance is encouraged rather than stigmatised. Although self-care and resilience are valuable, they must be complemented by institutional and systemic measures that support professional well-being [35].

Artificial intelligence and digital technologies

Artificial intelligence (AI) and digital technologies are transforming dentistry by supporting diagnosis, treatment planning, clinical workflow management and patient communication. However, their integration into dental practice introduces additional ethical and professional responsibilities. Concerns include the accuracy and reliability of AI-generated outputs, algorithmic bias, data privacy, confidentiality and the potential for excessive reliance on automated recommendations. AI-generated information may be inaccurate, incomplete or unsuitable for an individual patient; therefore, clinical responsibility cannot be transferred uncritically to a technological system. Dental professionals must retain independent clinical judgement, critically evaluate technology-assisted recommendations and communicate relevant benefits, limitations and uncertainties to patients. The use of patient records, radiographs and clinical photographs in digital platforms or AI systems also requires appropriate safeguards for confidentiality, data security and consent.

Important digital technologies in dentistry include intraoral scanners, cone-beam computed tomography (CBCT), computer-aided design and computer-aided manufacturing (CAD/CAM), and three-dimensional (3D) printing. AI-assisted image analysis may support the identification of dental caries, periodontal bone loss and periapical pathology. Digital visualisation tools may also help patients understand their oral conditions and proposed treatment options. Smartphone-based applications and remote monitoring systems can facilitate follow-up, particularly in orthodontic care, although their usefulness depends on the reliability of the technology and appropriate clinical oversight. Nevertheless, the implementation of digital systems may involve substantial initial expenditure on hardware, software licences and infrastructure, together with continuing investment in training and maintenance. Professionalism in the digital era therefore requires not only technological competence but also ethical awareness, critical appraisal, equitable access and accountability for clinical decisions [36].

The hidden curriculum

The hidden curriculum refers to the informal and often unintended learning that occurs through institutional culture, professional relationships, role modelling and everyday clinical

practices, beyond the formally prescribed curriculum. In dental education, students develop professional values not only through formal teaching in ethics and communication but also by observing how teachers and senior clinicians interact with patients, colleagues and support staff. Positive role models demonstrate empathy, integrity, accountability, respect and patient-centred decision-making. Conversely, behaviour that contradicts formally taught ethical principles may undermine students' developing professional identities and normalise inappropriate practices. The hidden curriculum may be particularly influential because students often interpret the behaviour of experienced clinicians as an indication of accepted professional norms. Dental institutions should therefore recognise that professionalism is conveyed through everyday interactions as much as through structured teaching. As highlighted in contemporary discussions of oral health education, addressing the hidden curriculum requires deliberate efforts to align institutional culture, faculty behaviour and educational objectives with the values that dental education seeks to promote [37].

Generation gap and changing professional expectations

The generation gap in dentistry stems from a cultural and educational shift as Generation Z students (born between 1997–2012) enter clinical environments historically shaped by older, traditional faculty and single-dentist paternalistic models. Gen Z students are digitally native, expect instant information, and lean into digital communication tools, which contrasts with traditional pedagogical styles. Younger practitioners and students prioritize work-life balance, mental well-being, and structured team environments over the round-the-clock individual sacrifice demanded by older generations. Dentistry has transitioned from single-handed paternalistic authority to a multidisciplinary and heavily regulated team environment.

Experienced practitioners may emphasise traditional professional values and hierarchical relationships whereas younger dentists may favour collaborative decision-making, digital communication and a stronger distinction between professional and personal life. The difference should not be interpreted as evidence that one generation is inherently more or less professional than another. Rather, they reflect changing social expectations and working environments. Difficulties may arise when senior professionals perceive younger colleagues as insufficiently committed, or when junior practitioners experience established hierarchies as barriers to communication and constructive feedback. The enduring principles of professionalism should remain constant, while their practical expression evolves in response to changing patient expectations, societal values, and technological developments [38].

Social media and dental professionalism

Social media provides dental professionals with valuable opportunities for patient education, professional networking, public health advocacy and community engagement. However, its use also introduces significant ethical and professional responsibilities. Sharing clinical photographs, radiographs, videos or other identifiable patient information without appropriate, documented informed consent may breach confidentiality and undermine patient trust. Dental professionals must recognise that even apparently anonymous intraoral or facial images may permit identification when combined with other information. Maintaining appropriate boundaries in online interactions is equally important, particularly when personal and professional relationships overlap on social networking platforms.

Public criticism of colleagues, disclosure of confidential information, misleading promotional claims and the dissemination of unverified health information may damage professional credibility and public confidence in dentistry. Dental professionals and students should therefore receive explicit guidance on patient consent, confidentiality, digital boundaries, advertising standards and the responsible verification and communication of online information. Rather than discouraging social media engagement, dental education should promote its responsible use through clear institutional policies, reflective learning and practical guidance. E-professionalism should be regarded as an integral component of contemporary professional identity, extending the principles of ethical conduct, accountability and respect into digital environments [39].

A futuristic view of dental professionalism

A futuristic view of dental professionalism centers around AI-driven precision, chairside robotics, and a renewed commitment to the human-to-patient relationship. The core pillars can be listed as follows:

- **Artificial Intelligence in Diagnostics**: Neural networks analyze radiographs, 3D Cone Beam Computed Tomography (CBCT) scans, and intraoral images to identify cavities, gum disease, and micro-fractures earlier and more reliably than standard eye-checks.
- **Robotic-Assisted and Guided Procedures:** Systems like dynamic navigation and robotic arms provide sub-millimeter precision for complex treatments like dental implants. The clinician maintains control and clinical accountability while the machine stabilizes the path.
- **Real-Time Digital Workflows:** Intraoral scanners replace physical moulds, while in-office 3D printers and CAD/CAM milling machines turn digital blueprints into permanent crowns or prostheses in hours rather than weeks.
- **Automated Administration and AI Scribes:** Ambient AI listening tools transcribe patient-dentist conversations into structured clinical notes in real time, cutting hours of daily paperwork and reducing clinician burnout.
- **The Centrality of Human Ethics:** While algorithms crunch data and robots assist with mechanics, trust, high-level empathy, and ethical responsibility remain strictly human domains [40].

The landscape of dentistry is undergoing a profound transformation, driven by an accelerating pace of technological innovation. As we cast our gaze forward, the vision that emerges, shaped by a diverse group of dental practitioners profoundly enhances clinical practice, while human expertise and ethical considerations remain paramount. Understanding and embracing this evolving paradigm will be crucial to shaping the future of oral healthcare.

Dentistry in the future will be a dynamic and exhilarating field, characterised by the pervasive integration of AI and digital technologies that enhance precision, efficiency, and personalisation. While these advancements will redefine the tools and techniques of practice, the core values of human expertise, ethical responsibility, and patient-centred care will remain the cornerstone of the profession.

Conflict of Interest

The authors declare that they do not have any conflict of interest.

CRediT Author Contributions

Conceptualization- K. Chandrasekharan Nair, Review of articles- Pradeep Dathan, Murukan PA; Initial draft preparation: Pradeep Dathan, Review and editing- K.Chandrasekharan Nair, Supervision-K. Chandrasekharan Nair.

All the authors have read and agreed to the published version of the manuscript.

Acknowledgements

The authors acknowledge the use of an artificial intelligence language model developed by OpenAI, for assistance in editing and improving the readability of certain portions of the manuscript.

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