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PROFESSIONAL RECOGNITION AND LICENSING IN DENTISTRY IN THE AGE OF ISO CERTIFICATION SYSTEMS: A GLOBAL REVIEW

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ABSTRACT

Dentistry is regulated worldwide through statutory licensing systems that grant individual practitioners the legal right to practise, and, increasingly, through voluntary certification frameworks built on documents issued by the International Organization for Standardization (ISO) that attest to the quality of dental materials, instruments, management systems and, in principle, individual competence. Confusion between these two forms of professional recognition is common among practitioners, regulators, patients and policymakers, with implications for patient safety, workforce mobility and professional identity. This review examines the relationship between statutory professional licensing and ISO-based certification systems in dentistry globally. A narrative review of the published literature, regulatory documents, and technical committee records was undertaken, covering dental material and device standards developed by ISO Technical Committee 106 (ISO/TC 106), management-system certification under ISO 9001, personnel certification under ISO/IEC 17024, and information-security standards relevant to digital dentistry, alongside statutory licensing arrangements in the European Union, the United Kingdom, North America, Australasia, the Gulf Cooperation Council and sub-Saharan Africa. The review finds that ISO standards in dentistry principally govern products, laboratory test methods and organisational quality-management systems rather than individual clinical licensure, and that ISO/IEC 17024, although capable of underpinning personnel certification, remains largely unused by statutory dental regulators. Licensure continues to rest on national legislation, professional boards and accreditation of dental education, with mutual recognition agreements offering only partial and regionally fragmented pathways for workforce mobility. ISO certification and statutory licensing are best understood as complementary rather than interchangeable mechanisms: ISO systems can strengthen quality assurance, patient safety and the international credibility of dental practices, but they cannot substitute for the legal function that licensure performs in protecting the public. Greater conceptual clarity around these distinct but overlapping mechanisms is needed to guide health policy, professional associations and individual practitioners.

Keywords: Dental Licensure; ISO Standards; Professional Certification; Quality Management Systems; Mutual Recognition of Qualifications; Oral Health Workforce

1 INTRODUCTION

Oral diseases remain among the most prevalent non-communicable conditions worldwide, affecting an estimated 45% of the global population, or 3.5 billion people, according to the World Health Organization (WHO) Global Oral Health Status Report [5]. The scale of this burden, together with the marked inequity in its distribution between high-income

and low- and middle-income countries [5], underscores the importance of a dental workforce that is both adequately supplied and reliably competent. Two largely separate mechanisms determine whether a person is recognised as fit to practise dentistry, or whether a dental product, device or practice meets an acceptable quality threshold: statutory professional licensing, administered by governmental or government-delegated regulatory bodies, and voluntary certification, frequently built on standards published by the International Organization for Standardization (ISO).

Licensure is a mandatory legal process by which a governmental or statutorily empowered regulatory authority grants an individual permission to practise a profession, on the basis that minimum standards of education, competence and conduct have been met; it is compulsory, and practising without a licence is typically a criminal offence [8]. Certification, by contrast, is usually a voluntary process administered by a non-governmental body, professional association or accredited certification body, which attests that a defined standard of competence, process or product quality has been achieved [8,9]. Accreditation, a related but distinct concept, applies to institutions, programmes or organisations rather than to individuals [9,10]. These distinctions, well established in general professional-regulation literature, are frequently blurred in dentistry, where practitioners, dental practices and even regulators refer loosely to being "ISO certified", "licensed" or "accredited" without precision as to which mechanism, and which specific standard, is actually in play.

The ISO dimension of this landscape has grown substantially since ISO Technical Committee 106 (ISO/TC 106, Dentistry) was established in 1962, building on nine specifications originally produced by the FDI World Dental Federation between 1953 and 1958 [2]. ISO/TC 106 today has a formal scope covering the standardisation of terminology, test methods and specifications applicable to materials, instruments, appliances and equipment used in all branches of dentistry [1,2], and its output now numbers in the hundreds of published standards, with dozens more under development at any time [1]. Separately, general-purpose ISO management-system standards, most notably ISO 9001 (quality management) and, increasingly, ISO 13485 (medical devices) and ISO/IEC 27001 (information security), have been adopted voluntarily by individual dental clinics seeking external validation of their organisational quality [13,14]. A third and less widely applied instrument, ISO/IEC 17024, sets requirements for bodies that certify the competence of individual persons, and could in principle underpin internationally consistent competence certification for dental practitioners, in a manner distinct from, but potentially complementary to, statutory licensure [11,12].

Meanwhile, statutory licensing of dentists remains a fundamentally national or sub-national function, exercised through professional boards or councils established by domestic legislation, such as the General Dental Council in the United Kingdom, state dental boards in the United States, the Dental Board of Australia, and the Health Professions Council of South Africa (HPCSA) acting through its Professional Board for Dentistry. Regional and bilateral mutual recognition arrangements, such as the (now-modified, post-Brexit) European Union mutual recognition directive, the Trans-Tasman arrangement between Australia and New Zealand, and various Asia-Pacific Economic Cooperation (APEC) mutual recognition agreements, provide only partial and unevenly applied pathways for cross-border recognition of dental qualifications [17,18,20,21].

Given the parallel expansion of ISO-based certification activity in dentistry and the continued fragmentation of statutory licensing systems internationally, there is a need to clarify how these two mechanisms of professional and product recognition relate to one another. This review therefore aims to: (i) clarify the conceptual distinction between licensure, certification and accreditation as applied to dentistry; (ii) describe the principal ISO standards relevant to the dental profession, spanning materials, management systems and personnel certification; (iii) provide a comparative overview of statutory dental licensing arrangements across several world regions; and (iv) critically examine the extent to which ISO certification systems intersect with, support, or are mistaken for, formal professional recognition and licensing of dentists.

2 MATERIALS AND METHODS

This article is a narrative review, structured to provide a broad, critical synthesis of a topic that spans regulatory, standards and health-workforce literatures rather than a single, narrowly defined clinical question; a narrative rather than systematic design was therefore judged appropriate.

2.1 Search strategy and sources

Literature and documentary sources were identified between August and September 2026 using PubMed/MEDLINE, Google Scholar, and the websites of relevant standards and regulatory organisations. Search terms combined "dentistry" or "dental" with "ISO", "ISO 9001", "ISO/IEC 17024", "licensure", "licensing", "certification", "accreditation", "mutual recognition", and "regulation", together with country- or region-specific terms (for example, "European Union", "United Kingdom", "Australia", "Gulf Cooperation Council", "South Africa"). Primary documentary sources included the ISO website and the ISO/TC 106 committee portal, World Health Organization publications, FDI World Dental Federation policy statements, national and regional dental regulator publications (including the UK General Dental Council, the American Dental Association, the Dental Board of Australia/Australian Health Practitioner Regulation Agency, the

Health Professions Council of South Africa, and the Asia-Pacific Economic Cooperation Secretariat), and peer-reviewed journal articles indexed in PubMed and related databases.

2.2 Selection and eligibility

English-language sources published between 1996 and 2026 were prioritised, with earlier historical material retained where it provided necessary context (for example, on the founding of ISO/TC 106). Sources were included if they described: the scope or content of dentistry-relevant ISO standards; the conceptual distinction between licensure, certification and accreditation; statutory dental licensing or registration requirements in a defined jurisdiction; mutual recognition arrangements for dental qualifications; or the application of quality-management or personnel-certification standards within dental practice. Non-peer-reviewed commercial or promotional material was used sparingly and only where it usefully illustrated current market practice (for example, ISO 9001 implementation in dental clinics), and such material is clearly identified as such in the discussion.

2.3 Synthesis

Findings were organised thematically rather than by individual source, structured around the conceptual distinction between licensure and certification, the principal families of ISO standards relevant to dentistry, comparative statutory licensing arrangements, and the interface between these two systems of recognition. As this is a narrative review of published, publicly available literature and regulatory documents, involving no human participants, patient data or original clinical data collection, institutional ethical approval and informed consent were not required.

3 RESULTS AND DISCUSSION

3.1 Licensure, certification and accreditation: a necessary conceptual distinction

The regulatory literature draws a consistent three-way distinction. Licensure is mandatory, is granted by a governmental or statutorily delegated authority, and its purpose is protection of the public; practice without a licence is unlawful [8,33]. Certification is voluntary, is usually granted by a non-governmental professional body or accredited certification body, and its purpose is to demonstrate that a defined level of competence, process quality or product quality has been achieved, over and above any minimum legal threshold [8,9,10]. Accreditation, in turn, is a voluntary process applied to institutions or programmes, such as dental schools or hospital departments, rather than to individual practitioners or single products [9,10]. Because certification and accreditation are voluntary and licensure is not, an ISO certificate held by a dental clinic or a piece of dental equipment carries no legal authority to practise dentistry; conversely, a licensed dentist is under no general legal obligation to hold any ISO certification. The two systems answer different questions: licensure asks whether an individual may lawfully treat patients at all, while ISO-based certification asks whether a product, material, management system or, potentially, a defined competence meets an internationally agreed benchmark.

3.2 ISO/TC 106 and the standardisation of dental materials, instruments and devices

ISO/TC 106 (Dentistry) is the ISO technical committee principally responsible for oral healthcare standardisation, covering terminology and definitions, performance, safety and specification requirements for dental products, and clinically relevant laboratory test methods [1,2]. Established in 1962 under the secretariat of the British Standards Institution, and transferred to Standards Council Canada (administered by the Canadian Dental Association) in 2004, the committee has met in nineteen countries and produced standards covering an extensive range of clinical materials and instruments, from soft lining materials for dentures and corrosion test methods for metallic restorative materials, to endodontic sealing materials, rotary instruments, dental implant system technical files, and orthodontic components [1,2,6]. The FDI World Dental Federation formally endorses the alignment of oral healthcare with ISO/TC 106 standards, characterising them as "a formula that describes the best way of doing something" that provides a basis to certify and harmonise dental products in support of high-quality care [3].

Critically, ISO/TC 106 standards are standards for products and test methods, not for individual practitioners. Compliance is typically demonstrated by manufacturers of dental materials, instruments and devices, and, where relevant, by dental laboratories, rather than by the dentist personally. A dentist who uses ISO-compliant composite resin or an ISO-compliant dental implant system has not thereby obtained any personal credential; the standard instead provides assurance regarding the safety, performance and consistency of the product itself. This is an important and frequently misunderstood point in professional discourse, where "ISO-approved" materials are sometimes conflated, inaccurately, with a form of practitioner recognition.

3.3 ISO 9001 and management-system certification in dental practice

A distinct and growing application of ISO standards in dentistry concerns the certification of the dental practice as an organisation, most commonly under ISO 9001, the generic quality-management-system standard first issued in 1987 and now held by over a million certified organisations worldwide across all sectors ^[16]. ISO 9001 certification of a dental clinic evaluates operational methods, documented procedures, staff competence management, patient-complaint handling and continuous-improvement processes, typically through external audit by an accredited certification body ^[15]. Reported motivations for dental practices to pursue ISO 9001 certification include improved organisational structure, enhanced patient satisfaction and trust, market differentiation, and, in some jurisdictions, eligibility for agreements with private or state health insurers ^[13], although doctors and dentists are generally under no legal obligation to hold such certification ^[13]. Related, more specialised standards are increasingly cited alongside ISO 9001 in the dental-clinic context, including ISO 13485 for organisations handling medical devices and ISO/IEC 27001 for information-security management relevant to electronic patient records and, increasingly, teledentistry platforms ^[14]. A narrative review of quality-management initiatives in dental clinics similarly identified ISO 9001 as one of a small number of structured quality-assurance methods, alongside patient questionnaires and clinical guidelines, applied internationally in dental health services ^[15], and a 2026 narrative review of quality control in orthodontic practice likewise situates ISO-based and total-quality-management frameworks as tools for integrating clinical excellence into daily orthodontic workflow ^[19].

As with product standards, ISO 9001 certification is organisational rather than personal: the certificate is issued to the practice or legal entity, not to the individual dentist, and its scope is management-system performance rather than clinical competence. A dentist who leaves an ISO 9001-certified practice does not carry that certification with them to a new post, and the certificate says nothing directly about an individual clinician's technical skill, diagnostic accuracy or hands-on ability. Nonetheless, well-implemented quality-management systems plausibly support safer, more consistent care indirectly, through standardised sterilisation protocols, documented consent processes, and structured continuing staff training, even though this benefit is organisational rather than a substitute for individual licensure.

3.4 ISO/IEC 17024 and the unrealised potential of personnel certification in dentistry

A third, less prominent ISO instrument is directly relevant to individual professional recognition: ISO/IEC 17024, "Conformity assessment — General requirements for bodies operating certification of persons", first published in 2003, substantially revised in 2012, and again reissued in 2026 ^[11,12]. This standard sets requirements not for the person being certified, but for the certification body itself, covering its structure, impartiality, resources, and the development and maintenance of the certification scheme, including a formal job or practice analysis to identify the tasks and competencies relevant to a given occupation ^[12]. It has been applied internationally to certify competence in fields such as welding, gas-appliance installation, data-protection practice and building energy assessment, precisely because it offers a globally benchmarked, portable and internationally recognised means of demonstrating individual competence, independent of any single national jurisdiction ^[11,12].

In dentistry, ISO/IEC 17024-based personnel certification remains, by contrast, essentially unused at the level of general clinical practice; the review identified no major national dental regulator that has adopted an ISO/IEC 17024-accredited scheme as an alternative or supplement to statutory licensure of general dental practitioners. This is a notable gap, given the stated purpose of the standard, to allow individuals to hold skills that "translate across national lines" in an increasingly mobile global workforce ^[12], precisely the challenge that mutual recognition agreements for dentists have struggled to resolve (see section 3.6). Whether this gap reflects a considered judgement by dental regulators that statutory licensure already performs this function adequately, the complexity of transposing a generic personnel-certification standard onto a clinically hands-on profession, or simply limited awareness of ISO/IEC 17024 within dental regulatory circles, is not resolved in the literature reviewed, and represents an area warranting further policy analysis.

3.5 Comparative overview of statutory dental licensing systems

Statutory dental licensing remains a fundamentally jurisdiction-specific exercise, administered through national or sub-national professional boards, with considerable variation in structure, examination requirements and recognition of foreign qualifications.

In the United Kingdom and the European Union, dental qualifications were historically subject to mandatory reciprocal recognition under EU directive obligations; following the United Kingdom's departure from the European Union, this arrangement was replaced by the Professional Qualifications Act 2022, which empowers UK regulators such as the General Dental Council to determine, on an individual or bilateral-agreement basis, whether an overseas-trained dentist possesses "substantially the same knowledge and skills, to substantially the same standard" as a UK-qualified dentist ^[17]. A comparative mapping study of undergraduate dental curricula across European Union member states found considerable variation in the specification of national learning outcomes, with formal national outcomes identified for only seven of the countries studied, and no information available for a further six, together with limited representation

of leadership and self-limitation competencies in curricula overall ^[17], illustrating that even within a historically integrated mutual-recognition area, the underlying substantive equivalence of dental training is difficult to verify with precision.

In the United States, dental licensure remains a state-based function; internationally trained dentists must generally satisfy state-specific requirements regarding clinical assessment, credential verification and continuing education, and programmes accredited by the American Dental Association's Commission on Dental Accreditation are recognised reciprocally with equivalent Canadian accreditation ^[18], but a dental degree obtained in one country provides no automatic entitlement to practise in another.

In Australia and New Zealand, dentists are registered nationally through the Australian Health Practitioner Regulation Agency acting for the Dental Board of Australia, which also assesses overseas-trained practitioners; registered New Zealand dentists benefit from general registration in Australia under the Trans-Tasman mutual recognition arrangement, irrespective of where their original qualification was obtained ^[19,20], and, at the time of writing, further reforms to registration pathways for internationally qualified dental practitioners were under active policy development in Australia, following the Kruk Review of health practitioner regulatory settings ^[19].

In the Gulf Cooperation Council (GCC), each of the six member states, the United Arab Emirates, Saudi Arabia, Qatar, Bahrain, Oman and Kuwait, operates an entirely independent licensing regime with its own health authority, examination format and specialist-recognition process; a dentist who has cleared one country's licensing examination has no automatic right to practise in a neighbouring GCC state, and specialist classifications awarded in one jurisdiction are not automatically recognised in another ^[21], illustrating that regional geographic and economic proximity does not, by itself, produce regulatory convergence.

More broadly, the Asia-Pacific Economic Cooperation (APEC) region maintains an inventory of mutual recognition agreements covering professional licensure across its twenty-one member economies, including specific agreements relevant to dental practitioners, but these agreements vary considerably in the number of professions and economies covered, their legal effect on licensure, and their practical ease of use by individual professionals ^[20], again pointing to a fragmented rather than harmonised global picture.

In South Africa, the regulatory context relevant to this review's authorship, dentistry and the broader oral health team are registered through the Health Professions Council of South Africa (HPCSA), acting through its Professional Board for Dentistry and related boards, such as the Professional Board for Dental Therapy and Oral Hygiene, which additionally regulates dental therapists, oral hygienists and dental assistants; registration is a precondition for lawful practice, and practising, or employing an unregistered person to practise, in a regulated dental category is a statutory offence ^[22]. As in other jurisdictions, HPCSA registration is entirely distinct from any ISO-based certification that an individual practitioner or dental practice might separately choose to obtain.

3.6 Mutual recognition and workforce mobility: a fragmented landscape

A recurring theme across regions is that mutual recognition of dental qualifications, whether framed as an outright legal obligation (historically, within the European Union), a discretionary bilateral-agreement mechanism (the post-Brexit UK model, or APEC-style agreements), or a close-neighbour reciprocal arrangement (Trans-Tasman recognition), remains partial, regionally bounded and administratively complex. No global mechanism for dental qualification recognition analogous to ISO's international standards infrastructure for products currently exists for individual licensure; each mutual recognition arrangement is negotiated separately, generally covers a limited set of countries, and can be altered unilaterally by domestic legislative change, as the United Kingdom's transition away from the EU mutual recognition directive illustrates ^[17,18]. This stands in some contrast to the ISO system, in which a single published standard, once adopted by ISO/TC 106 or a relevant ISO/IEC committee, is, in principle, available for reference and adoption by any of ISO's member national standards bodies worldwide ^[1,2]. The absence of an equivalent globally portable mechanism for individual dental licensure is precisely the gap that a mature, internationally accredited ISO/IEC 17024 personnel-certification scheme for dentistry could, in principle, begin to address, although, as noted in section 3.4, no such scheme has achieved substantial uptake among statutory regulators to date.

3.7 The interface between ISO certification and statutory licensing: complementary, not interchangeable

Drawing the preceding sections together, three distinct ISO-related mechanisms operate in and around the dental profession, each with a different object of certification: ISO/TC 106 and related product standards, whose object is the dental material, device or instrument; ISO 9001, ISO 13485 and ISO/IEC 27001, whose object is the dental practice or organisation as a management system; and ISO/IEC 17024-based personnel certification, whose object is, potentially, the individual practitioner's competence, but which remains largely undeveloped as applied to general dental practice. Statutory licensure, by contrast, has a single, consistent object across all these standards: the individual practitioner's legal entitlement to treat patients, granted by a governmental authority on public-protection grounds ^[8,33].

This layered structure means that ISO certification and statutory licensing are, properly understood, complementary rather than competing or interchangeable systems. A dental practice can be simultaneously staffed only by HPCSA-, General Dental Council- or state board-licensed dentists (satisfying the legal minimum), while also holding ISO 9001 certification (demonstrating organisational quality management) and using only ISO/TC 106-compliant materials (demonstrating product safety and performance), without any one of these three layers substituting for another. The practical risk identified in this review is not that these systems conflict, but that marketing and lay usage of the term "ISO certified" can create an impression of enhanced clinical credentialing or endorsement of the individual dentist that the underlying standard does not, in fact, confer ^[13,24]. Professional bodies, regulators and dental associations arguably have a role in clarifying this distinction publicly, given its relevance to informed patient choice and to the integrity of professional titles.

3.8 Workforce equity and low- and middle-income country perspectives

The relationship between certification systems and workforce equity deserves particular attention. Globally, there are approximately 3.30 dentists per 10,000 population, and a combined oral health workforce (dentists, dental therapists and assistants, and dental prosthetic technicians) of 5.31 per 10,000, with marked regional inequality, most notably between the WHO European and African regions ^[7]. Country income status and population urbanisation are strong predictors of workforce density, and maldistribution between urban and rural areas represents a particular challenge, especially for lower-income countries ^[7]. In this context, resource-intensive voluntary certification processes, such as ISO 9001 audit and certification fees, or the infrastructure required to develop an ISO/IEC 17024-accredited personnel-certification scheme, are more readily accessible to well-resourced practices and higher-income health systems, raising the possibility that voluntary ISO-based recognition could, without deliberate policy attention, reinforce rather than reduce existing inequities in who is seen to deliver "quality-assured" dental care. The 2022 WHO Global Strategy on Oral Health explicitly foregrounds workforce development and skill-mix as central to achieving universal health coverage for oral health by 2030 ^[5,6], and any expansion of ISO-based certification activity in dentistry should, in the authors' view, be considered alongside, rather than instead of, this broader public health workforce agenda, particularly given that statutory licensure, not voluntary certification, remains the primary lever available to policymakers for regulating workforce supply, scope of practice and skill mix in underserved areas.

3.9 Emerging issues: digital dentistry, data security and future directions

Two further developments are likely to shape the interaction between ISO systems and dental professional recognition going forward. First, the increasing use of digital workflows, including intraoral scanning, CAD/CAM design and manufacture, and electronic patient records, has brought general-purpose information-security standards such as ISO/IEC 27001 into the dental-practice quality-management conversation, alongside the more established ISO 9001 and ISO 13485 ^[14]. Second, the rise of teledentistry and cross-border digital consultation raises fresh questions about which jurisdiction's licensure regime applies when a dentist and patient are not physically co-located, questions that existing mutual recognition frameworks, designed around physical practice location, were not built to answer, and that a more developed personnel-certification infrastructure under ISO/IEC 17024 might, in future, help to address by providing an internationally verifiable, portable record of individual competence distinct from, but potentially referenced by, national licensing decisions.

4 CONCLUSION

ISO certification and statutory professional licensing occupy distinct but complementary positions within the global governance of dentistry. ISO/TC 106 and related product standards govern the safety and performance of dental materials, instruments and devices; ISO 9001 and allied management-system standards certify the organisational quality of the dental practice; and ISO/IEC 17024 offers, but has not yet been widely used to deliver, a framework for internationally portable personnel certification of individual practitioners. None of these mechanisms substitutes for statutory licensure, which remains a nationally or sub-nationally administered, legally mandatory process grounded in public protection, and which continues to be only partially and unevenly linked across borders by mutual recognition agreements. As dental practices increasingly seek ISO certification for competitive, organisational and patient-trust reasons, and as workforce mobility and digital dentistry continue to expand, there is a clear need for professional bodies, regulators and individual practitioners to maintain, and to communicate to patients, a precise distinction between what ISO certification does and does not confer, so that voluntary quality certification strengthens, rather than obscures, the primacy of statutory licensure in safeguarding patients worldwide.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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