

## HEADLINES

- The nature of the diseases that oral medicine specialists diagnose and manage throughout the oral and maxillofacial region are diverse and closely related to other dental and medical specialties.
- This relatively young area of dentistry has expanded globally during the past decade as an independent discipline with postgraduate qualifying programmes being offered in several countries, as well as an increasing research community.
- With a growing proportion of elderly individuals in the population in general across the world, morbidity is likely to increase in terms of both general diseases and conditions in the oral and maxillofacial region. The types of diseases requiring treatment may also differ in the future due to a greater influx of immigrants to the Nordic countries.
- The wide variety of conditions encountered in a dental practice, as well as variations in the individual patient presentation and response to treatment, defines the need for careful evaluation and synthesis of practice recommendations to provide appropriate and effective management. The field of oral medicine still lacks clear guidelines for various conditions and treatments. Thus, further studies are required to improve patient healthcare.
- For the discipline of oral medicine, it will be reasonable to take a greater responsibility for the basic medical skills in the dental curriculum, as modern oral medicine is increasingly becoming the intermediate between oral health care and general medicine.

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Accepted for publication August 28th, 2023

The article is peer reviewed.

To be cited as:

Bankvall M, Legert KG, Hasséus B, Rautava J, Richter S, Pedersen AML, et al. Past and future perspectives of oral medicine in the Nordic countries as a reflection of the global community. *Nor Tannlegeforen Tid*. 2024; 134: 10-20.

Keywords: Oral medicine, Scandinavian and Nordic countries, demography, education, evidence-based dentistry

# Past and future perspectives of oral medicine in the Nordic countries as a reflection of the global community

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The nature of the diseases that oral medicine specialists diagnose and treat throughout the oral and maxillofacial region are diverse and often closely related to other dental and medical specialties.

The definition of oral medicine varies partly between the Nordic countries. Specialty training in this specific discipline is offered in Sweden. For the other Nordic countries, it is included foremost in oral and maxillofacial surgery or oral pathology specialist training. Furthermore, there is no specific research training programme in oral medicine in Nordic countries, yet many published PhD theses are oral medicine related.

For all Nordic countries, there is a trend in an aging population and increasing immigration influx requiring specific knowledge in the subject of oral medicine. Additionally, the advancement of medical treatments, often affecting the oral and maxillofacial region, creates a new panorama for the discipline requiring oral medicine to become more integrated into primary health care. Prevention and treatment of oral diseases should be as important to manage as diseases affecting other parts of the body. This can be

achieved through interdisciplinary collaborations and educational programmes. Therefore, the concept of oral medicine should in the future more greatly emphasize oral health care in general medicine.

The nature of the diseases that oral medicine specialists diagnose and treat throughout the oral and maxillofacial region are diverse. Additionally, they are often closely related to other dental specialties, such as oral and maxillofacial surgery, oral pathology, periodontology, and paediatric dentistry, as well as medical specialties, including dermatology, gastroenterology, oncology, rheumatology, immunology, and otorhinolaryngology, making interdisciplinary collaborations necessary. This relatively young area of dentistry has been expanding globally during the past decade as an independent discipline with postgraduate qualifying programmes being offered in several countries, as well as an increasing research community.

## Definition of oral medicine

This branch of dentistry is generally defined as related to the oral healthcare of patients suffering from chronic, recurrent, and medically related disorders of the mouth and maxillofacial region and with their diagnosis and mostly nonsurgical management (1). Scopes and definitions differ between countries and regions (Table 1), likely resulting from cultural economic differences, heterogeneity of settings and healthcare systems (2). Ultimately, this variability may influence training and clinical practice, international collaborations, and future development of the field.

## History of oral medicine

The birth of oral medicine dates to the United States (U.S.) in 1925 when dr. Francis P. McCarthy (1883-1970), certified in both dermatology and pathology, combined expertise from both areas to manage patients with complex oral manifestations. He was also the first to introduce a course of oral medicine lectures at a dental school, Tufts University School of Dental Medicine in Boston (3), where he himself had obtained his degree. In addition, he opened the first ever clinic focused on oral medicine.

Later, in 1945, the first scientific organization of oral medicine was established, which later became the American Academy of Oral Medicine (AAOM) (4). In the 1950s and 1960s, certified training programmes in this field spread throughout the U.S. The first oral

**Table 1. A comparison of definitions of oral medicine with focus on the Nordic countries**

	Definition	Organization
United States	The specialty of dentistry concerned with the oral healthcare of medically complex patients and with the diagnosis and non-surgical management of medically related disorders or conditions affecting the oral and maxillofacial region	American Academy of Oral Medicine (AAOM) <a href="https://www.aaom.com/">https://www.aaom.com/</a>
United Kingdom	The specialty of dentistry concerned with the oral health of patients with chronic, recurrent and medically related disorders of the oral and maxillofacial region, and with their diagnosis and non-surgical management	The British & Irish Society for Oral Medicine (BISOM) <a href="https://bisom.org.uk/">https://bisom.org.uk/</a>
Norway	The specialty of dentistry concerned with medically related disorders or conditions affecting the oral and maxillofacial region. Currently no full consensus definition exists. However oral medicine involves the study of the intersection between medicine and dentistry	Oral medicine is included in the curriculum of the 5-year specialty in Oral and Maxillofacial Surgery (oral kirurgi og oral medisin). Thus, the professional organization in Norway is called Norsk forening for oral kirurgi og oral medisin <a href="https://www.tannlegeforeningen.no/">https://www.tannlegeforeningen.no/</a>
Sweden	The specialty of dentistry concerned with prevention, diagnostics, and treatment of disorders in the oral cavity and surrounding tissues, with a focus on oral mucosal conditions and their association and interactions with systemic diseases and medical treatments, especially in medically compromised patients. It also includes the special considerations and treatment difficulties associated with dental care in patients with geriatric conditions and developmental, cognitive, and psychiatric disorders.	Svensk förening för Orofacial Medicin (SOM) <a href="https://som.nu/">https://som.nu/</a>
Finland	The specialty of dentistry responsible for the diagnostics and non-surgical treatment of acute and chronic oral mucosal diseases and diseases, changes and conditions of the mouth and jaws related to general diseases and developmental disorders	Currently there is no established local organization.
Denmark	The specialty of dentistry which covers diseases and conditions of the oral mucosa, salivary glands, and jaws, including their aetiology, pathogenesis, symptoms, diagnosis, non-surgical treatment, prevention, and prognosis. They may be either primary oral diseases or manifestations of systemic diseases, and/or related to medically complex states, including adverse events of medical treatments or xenobiotics.	Oral medicine is included in the curriculum of the 5-year specialty in Oral and Maxillofacial Surgery (specialtandlæge i Tand-, Mund-og Kæbekirurgi). The professional organization in Denmark is called Dansk Selskab for Oral og Maxillofacial Kirurgi (DSMOK) <a href="https://dsomk.dk/dsomk/">https://dsomk.dk/dsomk/</a>
Island	The dental specialty is concerned with prevention, diagnosis, and non-surgical management of medical conditions affecting the oral and maxillofacial region as well as the oral healthcare of medically complex patients.	Currently there is no established local organization.

medicine board exam was held in 1956, and finally, in 2015, oral medicine gained recognition as a specialty approved by the American Board of Dental Specialties (5).

In the United Kingdom (UK), oral medicine as a discipline started to take form in the 1950s when those who had clinical expertise and research interest in oral surgery and oral pathology began to join forces. The British Society of Oral Medicine (BSOM) was established in 1981 (6), and later, in 1992, a Specialist List in Oral Medicine was introduced by the General Dental Council.

The work of establishing a European organization of oral medicine began in 1991, and in 1998, the European Association of Oral Medicine (EAOM) was formally founded (4). Furthermore, Professor Sir David Mason (UK) and Dr Dean Millard (U.S.) initiated the World Workshops in Oral Medicine (WWOM) in 1988, which has successfully continued to develop the field today (7).

Today, oral medicine is practiced in countries around the world across all six continents, where no less than 22 of the countries have some form of postgraduate training programme (2). There are both

international and regional organizations as well as national organizations for oral medicine, some of which are affiliated with other dental specialties, such as oral and maxillofacial surgery, oral pathology, and oral radiology.

#### *Norway*

In Norway, oral medicine as a separate dental discipline was put on the agenda in the late 1950s. Sophus Lossius, with degrees in both medicine and dentistry, was appointed professor of dental surgery at the Norwegian Dental College in 1948. Under his leadership at the University of Oslo, the first professorship in odontology with a special duty to teach both oral surgery and oral medicine was announced in 1960. Later, in 1964, the doctor and dentist Eigil Aas was appointed this position. These two professors with backgrounds in both dentistry and medicine gave oral medicine a focus on systemic diseases and their oral manifestations as well as medically complex patients. Manifestations of oral mucosal diseases were taught by oral surgeons and oral pathologists. Professor Jens Jørgen Pindborg (1921–1995) from the University of Copenhagen also played a major role in the development of oral medicine as a separate dental discipline in Norway. He was later awarded an honorary doctorate at the University of Oslo for his efforts. The Department of Dental Surgery at the University of Oslo changed its name in 1966 to the Department of Oral Surgery and Oral Medicine. At the University of Bergen, oral medicine was placed under the Department of Oral Surgery in 1978, and the department was then named the same as in Oslo, Department of Oral Surgery and Oral Medicine.

#### *Sweden*

In Sweden, the introduction of oral medicine/hospital dentistry began with the foundation of The Society for Hospital Dentists in 1941, an organization gathering both traditional hospital dentists and oral surgeons. However, in 1976, this society was divided into the Swedish Society for Maxillofacial Surgery and the Swedish Society for Hospital Dentists (SSHD). Furthermore, in 1990, the Swedish Society for Oral Medicine (SOMS) was established. Thus, there were now two societies with a slightly different focus but overlapping areas. While SSHD organized colleagues involved with traditional hospital dentistry, SOMS focused on oral mucosal diseases with or without systemic causes. During the 1990s, an emerging need for specialist education was identified, and authorities were approached in this matter. Therefore, discussions between SSHD and SOMS were initiated, which led to a merger of the two societies in 2010 and the foundation of the Swedish Society for Orofacial Medicine (SOM). During the 2010 decade, a new attempt was planned and carried out to establish the subject as a formal specialty in

dentistry. After implementation of a 3-year trial education in orofacial medicine in several regions in Sweden, structured as the other specialist training programmes, the Swedish National Board of Health and Welfare in 2018 finally recognized orofacial medicine as a specialty in dentistry. Professor Emeritus Tony Axéll and Professor Emeritus Mats Jontell have had a great impact on introducing oral medicine nationally and placing Sweden at the front edge internationally.

#### *Finland*

In Finland, oral medicine is not available as its own specialty. Instead, patients are diagnosed and treated within several dental and medical disciplines. However, there have been professors in oral medicine at the University of Helsinki, Maria Malmström and Yrjö Konttinen and at the University of Eastern Finland, Arja Kullaa. Currently, there is no professor in oral medicine at any of the Finnish universities. In 2019, the division of oral pathology and oral medicine, under the Finnish Dental Association, proposed introducing this discipline as its own specialty. This work was delayed by the COVID-19 pandemic, but in March 2023, a formal proposal was written by a specific work group and is currently (since April 2023) under consideration at the Ministry of Social Affairs and Health in Finland.

#### *Denmark*

In Denmark, the focus on oral mucosal diseases and their association with lifestyle factors such as smoking and alcohol or systemic diseases can largely be attributed to efforts by the famous professor J.J. Pindborg. He was appointed professor in oral histopathology in 1959 at the Royal Dental College in Copenhagen and performed numerous studies on precursors to oral cancer. This led to the World Health Organization (WHO) setting up an international centre for oral precancer in Copenhagen and offering J.J. Pindborg a visiting professorship in India in 1963. He planned and coordinated large-scale population studies together with Professor Fali S. Mehta to determine the prevalence and causes of oral cancer in India. More than 35 000 individuals underwent repeated examinations during a period of 10 years. They concluded that the prevalence of leukoplakia and oral cancer varied between different areas, depending on tobacco habits. Based on 20 years of research, J.J. Pindborg and F.S. Mehta were able to present the Indian authorities with two methods for combating oral cancer: primary prophylaxis (reducing the incidence of leukoplakia and cancer through behavioral changes) and secondary prophylaxis (detecting precursors to oral cancer and preventing further development of the disease through regular oral examinations). Their research was published in the *Lancet* and

other scientific journals (8). In later years, work has been done to acknowledge oral medicine and oral pathology as a specific specialty in Denmark. However, until now, negotiations with health authorities have been in vain. Currently, patients are referred to oral medicine clinics at the two schools of dentistry at the universities or to oral and maxillofacial departments at the university hospitals.

### *Iceland*

In Iceland, oral medicine has been available as its own specialty for many years. Primarily because of Professor W Peter Holbrook, who received his education and doctorate in Scotland. He became a professor at the University of Iceland, Faculty of Odontology in 1992, where he taught oral medicine and pathology until he retired a few years ago. Dr. Stefán Pálmason, a specialist in oral medicine, then took over responsibility for the training. Since Iceland merely has two specialists in oral medicine and there is a great demand for expertise within the field from hospitals and general practitioners, the workload is high, implying that patients with oral mucosal lesions are also treated by specialists in other areas as well as general dentists. Furthermore, there is no established specialty training in oral medicine in Iceland, resulting in training being pursued at universities abroad.

## **Demographics of oral medicine**

### *Norway*

By the end of 2022, the total number of inhabitants in Norway was 5 488 984. The population has increased by 61% from 1953 to 2021, largely because of rising life expectancy and, more recently, due to an increase in net immigration. The size is expected to reach 6 million in 2050, and the elderly will represent an increasing proportion of the population over the next decade. The proportion of persons 70 years or older will increase from 12% in 2020 to 21% in 2050. First-generation immigrants consist of persons from more than 200 countries, and by 1st of January 2021, they comprise 14.8% of the total population (800 094). An additional 4.9% of the Norwegian population are second-generation immigrants (Cancer Registry of Norway, <https://www.kreftregisteret.no>). With a larger proportion of the elderly in the population, more morbidity can be expected both in terms of general diseases as well as diseases in the oral cavity. The incidence rate (per 100 000 population) for lip and oral cavity cancer in 2020 was 2.6 for females and 4.5 for males. (Oral Health Country profile for Norway, WHO 2022, <https://www.who.int/publications/m/item/oral-health-nor-2022-country-profile>).

### *Sweden*

In January 2023, the number of Swedish citizens was 10 523 709 compared to 7 041 829 in 1950 and an estimated 11 835 808 in 2050

(Statistiska centralbyrån, [www.scb.se](http://www.scb.se)). In 2021, approximately 56% of the population was of working age (20–64 years). The number of people aged >65 years today averages 20% and will increase to approximately 28% in 2070 (Statistiska centralbyrån, [www.scb.se](http://www.scb.se)). In 2022, 102 436 immigrants came to Sweden from India, Syria, Germany, Pakistan, Polen, Iran, Iraq, Turkey and China, and immigrants now make up approximately 20% of the Swedish population (Statistiska centralbyrån, <http://www.scb.se>).

### *Finland*

The number of Finnish citizens was 5 566 812 in January 2023. The share of working-age people in the population is slightly over 60%. By 2060, both Finland's population and the number of people of working age are estimated to decrease significantly. According to Statistics Finland's population structure statistics, at the end of 2019, there were 874 314 people aged 70 or over in Finland. The number of people over 70 years of age has increased by 100 000 people in three years (Statistics Finland, <http://www.stat.fi>). Furthermore, Finnish citizenship was granted in 2020 to 7 816 foreign citizens permanently resident in Finland. In 2021, 8.5% of Finland's population had a foreign background. Of them, 83% had a first-generation foreign background, and 17% had a second-generation foreign background. In 2021, the most common country of origin of these people with a foreign background was the former Soviet Union. The next largest background country groups included Estonia, Iraq, Somalia, and the former Yugoslavia (Statistics Finland, <http://www.stat.fi>).

### *Denmark*

In Denmark, the number of citizens was 5 932 654 in the first quarter of 2023. In 1950, the number was 4 281 000. By January 1st 2023, the number of immigrants and descendants was 910,898 (15.4% of the total Danish population). In Denmark, the number of persons above 65 years of age is expected to increase by 35.8% until 2060, from 1.18 million in 2021 to 1.60 million in 2060. The largest increase occurs among persons above 80 years of age, where the number is expected to rise by 130.6%, whereas the increase among persons 65-79 years of age comprises 5.3% (<https://www.dst.dk/da/Statistik/emner/borgere/befolkning/>).

It has previously been shown that the prevalence of oral mucosal lesions among persons above the age of 65 years is high (75%) (9). In addition, xerostomia and hyposalivation are prevalent conditions often related to the intake of certain medications and polypharmacy (10-12). Additionally, neurogenerative diseases or early stages of impaired cognition can affect oral health and functions (13, 14). Furthermore, the risk of developing cancer increases with increas-

ing age, and the cancer treatment (chemotherapy, radiation therapy to the head and neck region, immunotherapy and endocrine therapy) itself may also affect the oral mucosa and functions directly or indirectly (15). The increasing use of biologicals in the treatment of inflammatory autoimmune diseases raises additional concerns in relation to oral side effects and odontological treatment planning. Moreover, with the increased immigration influx, specific health issues need to be addressed. Thus, the discipline of oral medicine needs to be dynamic and adapt to changes in demography, changing disease profiles and therapeutic approaches.

### *Iceland*

The population in Iceland was 387 758 by 1st January 2023, which is an increase of 3.1% (11 501 inhabitants) from 1st January 2022, making this the largest increase since 1734. Statistics Iceland published a population forecast in December 2022, according to which the country's population was expected to reach 393 000 by 2026. However, this increase has already been reached mainly due to a greater immigrant workforce. Approximately 63% of the population lives in the Greater Reykjavik area. Immigrants in Iceland were 61 148 or 16.3% of the population by 1st January 2022, compared to 1.9% in 1995 and 7.4% in 2015. This percentage increases continuously, showing the same trend as in the other Nordic countries. Although the population is aging and population growth will slow down, Icelanders are now and will continue to be much younger than most European nations. In 2060, more than a third of Europeans will be over 65, compared to 25% of Icelanders. It is expected that Icelanders will reach the current percentage within the EU (19%) in 2031. On 1st January 2018, 16% of the population of the European Union was under 15 years of age, and the oldest age group (65 years and older) accounted for 20%. The corresponding figures for the Icelandic population were 19% and 14%, respectively. By 2059, the younger age group is expected to reach 16%, and the oldest age group is expected to reach 20% by 2038 (<https://statice.is/statistics/population/inhabitants/>).

## **Education in oral medicine**

### *Norway*

In Norway, oral medicine is taught at the universities in Oslo, Bergen and Tromsø as part of the undergraduate curriculum in oral surgery and oral medicine and partly in collaboration with oral pathologists. At the University of Oslo and University of Bergen, oral medicine is taught in the 4th and 5th years with lectures and interdisciplinary courses, including otorhinolaryngology. Clinical training is given at the Department of Oral Surgery and Oral Medicine on patients referred from dental practitioners, physicians, otorhi-

nolaryngologists, oncologists, hematologists, rheumatologists, dermatologists, and others. There is no specific research training in oral medicine, but several of the PhD theses from the Norwegian dental schools are related to this field. Furthermore, a separate oral medicine course of 20 hours has also been established for the faculty's various specialist training programmes. In the Norwegian Dental Association's systematic continuing education program "TSE" (est. 1999), oral medicine was developed as the first module. This course has been conducted in all the country's counties several times. The module is based on problem-based learning and lasts for 3-4 months with two physical day sessions and distance learning in the interim period.

### *Sweden*

In Sweden, education in oral medicine is offered at four different universities, Umeå, Stockholm, Gothenburg, and Malmö, as part of the undergraduate curriculum in oral medicine and partly in collaboration with oral and maxillofacial surgery and oral pathology. When during the programme, it is taught varies between the universities but for all begins during the 3rd semester and is reintroduced for certain universities in semesters 4, 5, 8 and/or 9. Focus lies on oral medicine in the diagnostic process based on obtaining a medical history, clinical examination, laboratory analyses and establishing a treatment plan. Research training in oral medicine has been offered for many years at all four universities. For general dentists, various courses in oral medicine are accessible throughout the year, and currently, an extension training of one year for specialists in oral medicine is offered.

### *Finland*

In Finland, oral medicine is not available as its own discipline. Therefore, all four universities, Helsinki, Turku, Kuopio, and Oulu, have undergraduate dental programmes in their curriculum offering their own slightly differing schedules in oral medicine. The subject is taught as part of other disciplines, primarily within oral pathology and oral and maxillofacial surgery. The teaching is focused on the clinical setting, mainly during the fourth and fifth years of dental studies, on patients with oral mucosal diseases. Similarly, there has not been a postgraduate speciality of oral medicine in Finland. Therefore, the treatment of acute and chronic oral mucosal diseases and diseases, changes and conditions of the mouth and jaws related to general diseases and developmental disorders has varied depending on the competence of individual dentists. Again, the main specialists consulting and treating these patients have been oral pathologists and oral and maxillofacial surgeons as well as periodontologists. Currently, there is an on-going proposal in Fin-

land to establish a specialty of oral medicine. Likewise, there is no specific research training in oral medicine, but several PhD theses of varying specialties are oral medicine related.

#### *Denmark*

In Denmark, the curriculum for oral medicine at the School of Dentistry/Department of Odontology, University of Copenhagen, includes teaching of dental students during semesters 8, 9 and 10. Teaching includes clinical training at the Clinic for Oral Medicine. Approximately 500 hundred patients (children and adults) are referred to this clinic annually from dental practitioners, physicians, rheumatologists, otorhinolaryngologists, dermatologists and others. The patients present with a broad panoply of oral diseases and manifestations of systemic diseases. Until recently, the section had its own lab for oral pathology, where biopsies were handled and diagnosed. Biopsies are now sent to the Department for general pathology at the regional hospital. The teachers are faculty VIP/researchers with a dental degree (DDS) at the professor level, associate professor level, assistant professor level and PhD students. They also teach at the postgraduate level, including teaching at courses for otorhinolaryngology, oral surgery, and orthodontics.

#### *Iceland*

In Iceland, at the faculty of Odontology, oral medicine is taught mainly as a separate subject area but is also included within the subject of diagnostics, allowing patients to be examined at the faculty. The subject is primarily taught during the 6th year, and the patients present with a broad spectrum of oral diseases and manifestations of systemic diseases. For many years, the section had its own lab for oral pathology, but biopsies are now sent to the Department of Pathology, Landspítali, University Hospital or other labs.

### **Collaborations within and outside of the field of oral medicine**

#### *Norway*

In Norway, there is collaboration in oral medicine with all dental disciplines and a selection of medical disciplines, such as otorhinolaryngology, rheumatology, internal medicine, dermatology, oncology, plastic surgery, and endocrinology. Additionally, the patient's general practitioner is often involved.

#### *Sweden*

In Sweden, many patients are referred to orofacial medicine clinics by physicians both in outpatient and inpatient settings. This results in the treatment often being part of the overall medical treatment plan. Furthermore, with regard to education, many orofacial medicine clinics in Sweden collaborate where national web seminars are

organized on a regular basis as part of the specialist training programme. Additionally, the Swedish Oral Medicine Network (SOMNET) provides monthly seminars where oral medicine cases are discussed nationally among general dentists and specialists in orofacial medicine. There are also ongoing collaborations for international, national, and regional scientific studies.

#### *Finland*

In Finland, patients are diagnosed and treated within several dental and medical disciplines, mainly at the departments of oral and maxillofacial surgery at universities and central hospitals by oral pathologists, oral and maxillofacial surgeons, and periodontologists. This can sometimes cause problems concerning who has the overall responsibility for the patient. In addition, as oral medicine is not coordinated within Finland, the quality of diagnostics and treatment vary greatly depending on the competence of individual dentists and medical doctors.

#### *Denmark*

In the section for Oral Medicine and Pathology, Department of Odontology, University of Copenhagen, national and international cross-disciplinary collaboration is highly prioritized, as many of the patients display a complex medical profile. Currently, there are collaborations with dermatologists, pathologists, ophthalmologists, otorhinolaryngologists, rheumatologists, oncologists, endocrinologists, and universities in Scandinavia and the U.S.

#### *Iceland*

In Iceland, patients are treated at a dental department or a private clinic by a specialist in oral medicine. There is also cooperation with other medical disciplines, as many patients display a complex medical profile.

### **The evidence base of oral medicine**

Evidence-based dentistry implies producing clinical practical guidelines compiling all the available scientific evidence, resulting in clear recommendations on diagnosis and treatment (16). Ultimately, this task infers challenges, including the burden of proof required to formulate these guidelines, the necessarily narrow definitions of success and end points, and the inability for such combined statements to appropriately reflect individual patient presentations or outcomes (17, 18). Evidence-based dentistry recommendations have recently become increasingly specialty- and procedure specific, and the increase in available evidence-based guidelines has and will continue to refine and improve the worldwide practice of dentistry (19-21). Furthermore, the wide variety of conditions encountered in an oral medi-

**Table 2. Recommendations and guidelines for oral mucosal diseases and management strategies provided by the World Workshop on Oral Medicine (WWOM) from 2015–2023**

Topic	Authors	Journal	Year
World Workshop on Oral Medicine VI: a systematic review of the treatment of mucocutaneous pemphigus vulgaris	McMillan R et al.	Oral Surg Oral Med Oral Pathol Oral Radiol	2015
World Workshop on Oral Medicine VI: a systematic review of the treatment of mucous membrane pemphigoid	Taylor J et al.	Oral Surg Oral Med Oral Pathol Oral Radiol	2015
World Workshop on Oral Medicine VI: a systematic review of medication-induced salivary gland dysfunction: prevalence, diagnosis, and treatment	Villa A et al.	Clin Oral Investig	2015
World Workshop on Oral Medicine VI: Controversies regarding dental management of medically complex patients: assessment of current recommendations	Napeñas J J et al.	Oral Surg Oral Med Oral Pathol Oral Radiol	2015
World Workshop on Oral Medicine VI: clinical implications of medication-induced salivary gland dysfunction	Aliko A et al.	Oral Surg Oral Med Oral Path Oral Radiol	2015
World Workshop on Oral Medicine VI: a systematic review of medication-induced salivary gland dysfunction	Villa A et al.	Oral Dis	2016
A Guide to Medications Inducing Salivary Gland Dysfunction, Xerostomia, and Subjective Sialorrhea: A Systematic Review Sponsored by the World Workshop on Oral Medicine VI	Wolff A et al.	Drugs RD	2017
World Workshop on Oral Medicine VII: Burning mouth syndrome: A systematic review of disease definitions and diagnostic criteria utilized in randomized clinical trials	Ariyawardana A et al.	Oral Dis	2019
World Workshop on Oral Medicine VII: Non-opioid pain management of head and neck chemo/radiation-induced mucositis: A systematic review	Christoforou J et al.	Oral Dis	2019
World Workshop of Oral Medicine VII: A systematic review of immunobiologic therapy for oral manifestations of pemphigoid and pemphigus	Mays JW et al.	Oral Dis	2019
World workshop on oral medicine VII: Direct anticoagulant agents management for invasive oral procedures: A systematic review and meta-analysis	Manfredi M et al.	Oral Dis	2019
World Workshop on Oral Medicine VII: Platelet count and platelet transfusion for invasive dental procedures in thrombocytopenic patients: A systematic review	Karasneh J et al.	Oral Dis	2019
World Workshop on Oral Medicine VII: Immunobiologics for salivary gland disease in Sjögren's syndrome: A systematic review	Gueiros LA et al.	Oral Dis	2019
World Workshop on Oral Medicine VII: Bleeding control interventions for invasive dental procedures in patients with inherited functional platelet disorders: A systematic review	Karasneh J et al.	Oral Surg Oral Med Oral Pathol Oral Radiol	2022
WWOM VII: Effectiveness of systemic pharmacotherapeutic interventions in the management of BMS: A systematic review and meta-analysis	Farag AM et al.	Oral Dis	2023
World Workshop on Oral Medicine VII: Oral adverse effects to biologic agents in patients with inflammatory disorders. A scoping review.	France K et al.	J Oral Pathol Med.	2023

cine practice, as well as variations in the individual patient presentation and response to treatment, defines the need for careful evaluation and synthesis of practice recommendations to provide appropriate and effective treatment. The field of oral medicine still lacks clear guidelines for various conditions and treatments where further studies are required to improve patient healthcare.

To aid this work, there are several agencies assisting in developing these guidelines. An example of this is the WWOM, an international organization, aiming to create systematic reviews and other evidence-based articles on topics of importance to the specialty by defining recommendations for medications, surgical interventions, management practices, and diagnostic testing modalities and

**Table 3. Recommendations and guidelines for oral mucosal diseases and management strategies provided by the Cochrane Database of Systematic Reviews (CDSR) from 2007–2022**

Topic	Authors	Year
Interventions for preventing oral candidiasis for patients with cancer receiving treatment	Clarkson JE et al.	2007
Interventions for the management of oral submucous fibrosis	Fedorowicz Z et al.	2008
Interventions for the prevention and treatment of herpes simplex virus in patients being treated for cancer	Glenny AM et al.	2009
Interventions for the treatment of oral cavity and oropharyngeal cancer: radiotherapy	Glenny AM et al.	2010
Interventions for treating oral mucositis for patients with cancer receiving treatment	Clarkson JE et al.	2010
Interventions for treating oral candidiasis for patients with cancer receiving treatment	Worthington HV et al.	2010
Interventions for the management of dry mouth: topical therapies	Furness S et al.	2011
Interventions for preventing oral mucositis for patients with cancer receiving treatment	Worthington HV et al.	2011
Systemic interventions for recurrent aphthous stomatitis (mouth ulcers)	Brocklehurst P et al.	2012
Topical treatments for HIV-related oral ulcers	Kuteyi T and Okwundu CI	2012
Screening programmes for the early detection and prevention of oral cancer	Brocklehurst P et al.	2013
Dental extractions prior to radiotherapy to the jaws for reducing post-radiotherapy dental complications	Eliyas S et al.	2013
Interventions for the management of dry mouth: non-pharmacological interventions	Furness S et al.	2013
Clinical assessment to screen for the detection of oral cavity cancer and potentially malignant disorders in apparently healthy adults	Walsh T et al.	2013
Interventions for managing oral ulcers in Behçet's disease	Taylor J et al.	2014
Psychosocial interventions for the management of chronic orofacial pain	Aggarwal VR et al.	2015
Interventions for preventing oral mucositis in patients with cancer receiving treatment: oral cryotherapy	Riley P et al.	2015
Interventions for the treatment of oral and oropharyngeal cancers: targeted therapy and immunotherapy	Chan KKW et al.	2015
Parasympathomimetic drugs for the treatment of salivary gland dysfunction due to radiotherapy	Davies AN and Thompson J	2015
Diagnostic tests for oral cancer and potentially malignant disorders in patients presenting with clinically evidence lesions	Macey R et al.	2015
Oral health education (advice and training) for people with serious mental illness	Khokhar MA et al.	2016
Interventions for treating oral leukoplakia to prevent oral cancer	Lodi G et al.	2016
Oral health educational interventions for nursing home staff and residents	Albrecht M et al.	2016
Interventions for treating bisphosphonate-related osteonecrosis of the jaw (BRONJ)	Rollason V et al.	2016
Interventions for treating burning mouth syndrome	McMillan et al.	2016
Pharmacological interventions for preventing dry mouth and salivary gland dysfunction following radiotherapy	Riley P et al.	2017
Interventions for the treatment of oral and oropharyngeal cancers: surgical treatment	Bulsara VM et al.	2018
Antifibrinolytic therapy for preventing oral bleeding in people on anticoagulants undergoing minor oral surgery or dental extractions	Engelen ET et al.	2018
Oral hygiene interventions for people with intellectual disabilities	Waldron C et al.	2019
Interventions for preventing osteoradionecrosis of the jaws in adults receiving head and neck radiotherapy	El-Rabbany M et al.	2019
Interventions for preventing oral mucositis in patients with cancer receiving treatment: cytokines and growth factors	Riley P et al.	2019

Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia	Zhao T et al.	2020
Diagnostic tests for oral cancer and potentially malignant disorders in patients presenting with clinically evident lesions	Walsh T et al.	2021
Interventions for the treatment of oral cavity and oropharyngeal cancer: chemotherapy	Parmar A et al.	2021
Antibiotics to prevent complications following tooth extractions	Lodi G et al.	2021
Interventions for managing medication-related osteonecrosis of the jaw	Beth-Tasdogan NH et al.	2022
Antibiotic prophylaxis for preventing bacterial endocarditis following dental procedures	Rutherford SJ et al.	2022
Oral care measures for preventing nursing home-acquired pneumonia	Cao Y et al.	2022
Preprocedural mouth rinses for preventing transmission of infectious diseases through aerosols in dental healthcare providers	Kumbargere Nagraj S et al.	2022

identifying areas in which convincing evidence does not yet exist by using available, carefully gathered scientific proof. Thus far, international recommendations and guidelines are available for certain oral mucosal diseases and treatment strategies (Table 2).

Another important agency is The Cochrane Database of Systematic Reviews (CDSR) (<https://www.cochranelibrary.com/>), the leading journal and database for systematic reviews in health care, which has provided many guidelines for diagnosis and treatment within the area of oral medicine over the years (Table 3).

Additionally, the WHO provides different collaborating centers publishing consensus reports on topics such as oral potentially malignant disorders (22). Finally, other international and national groups also provide guidelines and recommendations for the diagnosis and treatment of oral medicine conditions.

### Future of oral medicine

With a larger proportion of elderly individuals in the population and a greater influx of immigrants to the Nordic countries, more morbidity can be expected both in terms of general diseases and diseases in the oral cavity. Patients will be even more likely to retain their teeth and to seek dental services to maintain acceptable oral functions. Major systemic chronic diseases, including cardiovascular diseases, hypertension, stroke, diabetes, cancer, chronic obstructive lung disease, musculoskeletal conditions, mental health conditions, blindness, and visual impairment, will also become more prevalent with aging. Additionally, diseases not so common to the Nordic countries that are more prevalent in other parts of the world will increase due to increased migration. Ultimately, this will challenge the dental workforce, and thus, knowledge in these areas must be an important part of future dental education. Focusing on interdisciplinary collaboration with other health care workers is also pertinent for the implementation of oral health as part of general health.

Current oral health care still poses several challenges, including large differences in oral health both within and between countries and in the importance of disease severity and prevalence. Political understanding and sufficient resources for the prevention of oral disease are often limited. Oral health programmes often have limited funding, are highly specialized and are often not included in interactions with primary health services. Therefore, in 2022, the WHO's General Assembly adopted a global strategy for oral health up to 2030 ([https://apps.who.int/gb/ebwha/pdf\\_files/WHA75/A75\\_10Add1-en.pdf](https://apps.who.int/gb/ebwha/pdf_files/WHA75/A75_10Add1-en.pdf)). The strategy has clear goals to include oral health in universal health coverage and to integrate oral health more closely together with the primary healthcare service. Thus, in the future, there will probably be some clear trends that will affect how dental education and dental health services are conceptualized and organized and how dental health personnel will be trained to provide good health services. Oral health care professionals will more clearly need to work side by side with other health workers to prevent and treat oral disease. Thus, the education of healthcare personnel should be more closely linked in interdisciplinary programmes. By integrating dentistry more strongly into the primary healthcare service, broader basic medical education will be needed.

The use of digital technology will also aid these goals. Electronic patient records that can communicate across professional disciplines, such as between services of dental health care, primary health care and specialist health care, will be an important step forward, leading to better and safer patient care. This may ultimately reduce the number of patient visits, transports, and less use of materials. The development of digital online visits may also improve and optimize patient care. Furthermore, artificial intelligence (AI) may assist challenging areas of oral medicine, such as diagnosis, prediction of treatment outcomes and disease prognosis, using highly refined algorithms, hopefully resulting in enhanced accuracy and efficiency.

The increasing number of medically and/or pharmacologically compromised individuals will require interdisciplinary collaboration and a robust dental health care system capable of facing societal demands. In addition, the prolonged survival of medically compromised patients and a still growing underserved population composed primarily of ethnic minority groups and the poor will

have a tremendous impact on future dental education and practice. As a result of the change in overall disease pattern and disease management, dentists are expected to yield expertise within the field of oral medicine bridging oral health care to general health care more clearly than ever before.

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