

CURRENT CHALLENGES AND FUTURE DIRECTIONS IN  
STOMATOLOGY: A COMPREHENSIVE REVIEW

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**Abstract:** Stomatology, as a branch of dentistry and oral medicine, faces evolving challenges arising from epidemiologic transitions, technological innovations, and systemic health interconnections. This review aims to summarize key current issues in stomatology, analyze their underlying causes, and propose future directions.

**Methods:** A narrative review of recent literature (2018–2025) from PubMed, Scopus, Web of Science, and major dental journals was conducted. Key topics were identified via keyword searches (“oral health challenges,” “digital dentistry,” “oral–systemic link,” “education in dentistry”) and clustered into thematic areas.

**Results:** Major challenges include (1) the growing burden of noncommunicable oral diseases (caries, periodontitis, oral cancer), (2) the oral–systemic health interface, (3) integration of digital technologies and artificial intelligence into diagnostics and treatment, (4) disparities in access to dental care, (5) dental education reform and training gaps, and (6) infection control and occupational safety. Opportunities include tele-dentistry, precision dentistry, salivary diagnostics, and interprofessional collaboration.

**Conclusions:** Addressing these challenges requires a multipronged approach: enhancing preventive public health strategies; rigorous validation and ethical use of digital tools; strengthening dental curricula; improving access equity; and promoting translational research into oral–systemic links. Future research should emphasize longitudinal studies, cost-effectiveness analyses, and implementation science.

**Keywords:** Stomatology; oral health challenges; digital dentistry; oral–systemic link; dental education; access to care

### Introduction

- Definition and scope of stomatology (oral medicine, oral surgery, periodontology, endodontics, etc.).
- Importance of oral health within general health and well-being.
- Rationale for review: rapid changes (aging populations, chronic diseases, new technologies) motivate summarizing current challenges and future directions.

## Materials and Methods

- **Search strategy:** Databases searched included PubMed, Scopus, Web of Science, using combinations of keywords (“oral health,” “dentistry challenges,” “digital dentistry,” “education in dentistry,” “oral-systemic diseases”).

- **Inclusion criteria:** Articles published between 2018 and 2025, reviews, original research, guidelines, consensus statements in English.

- **Exclusion criteria:** Case reports without broader implications, publications in non-English (unless essential), non-peer-reviewed sources.

- **Data extraction and synthesis:** Key themes and trends were tabulated; conflicting findings and gaps highlighted.

- **Limitations of review:** Narrative approach (not systematic), possible publication bias, heterogeneity among study designs.

## Main Body / Thematic Sections

### 1. Burden of Oral Diseases & Changing Epidemiology

- Dental caries and periodontitis remain pervasive globally, especially in low- and middle-income countries.

- The rise of tooth wear, erosive tooth loss, developmental defects, and aging-related oral problems.

- Oral cancer: late-stage diagnoses and survival disparities.

### 2. Oral–Systemic Health Interrelations

- Evidence linking periodontitis to diabetes, cardiovascular disease, Alzheimer’s disease. (MDPI)

- Bidirectional interactions: systemic inflammation, microbial translocation, immune modulation.

- Challenges: establishing causality, designing interventional trials, integrating dental with general medicine.

### 3. Digital Dentistry, AI, and Technological Integration

- Use of artificial intelligence (AI) in lesion detection, radiographic interpretation, treatment planning. (MDPI)

- 3D printing, intraoral scanners, CAD/CAM prosthodontics, guided surgery.

- Barriers: cost, training, data privacy, algorithm bias, regulatory approval, clinical validation.

### 4. Access Disparities & Public Health

- Urban vs rural inequalities, socioeconomic barriers to care, insurance and health systems gaps.

- The role of preventive public oral health programs, fluoride, school-based programs.

- Tele-dentistry and mobile clinics as potential mitigators.

### 5. Dental Education and Workforce Issues

- Curriculum reforms needed to incorporate digital skills, evidence-based practice, interprofessional training. (BioMed Central)

- Faculty shortages, cost of training, maintaining clinical exposure, adapting to new technologies.

- Continuing education and life-long learning.

### **6. Infection Control, Occupational Safety & Pandemic Preparedness**

- Lessons from COVID-19: aerosol-generating procedures, PPE, sterilization protocols. (BioMed Central)

- Occupational hazards: sharps injuries, exposure to pathogens, musculoskeletal stress. (Википедия)

- Preparedness for future infectious risks, antimicrobial resistance in oral pathogens.

### **Discussion**

- Synthesis of the major challenges, interconnections (e.g. digital tools can help access but also widen disparities).

- Critical issues: validation of new technologies, ethical use, resource constraints, resistance to change in educational systems.

- The need for multi-level interventions: policy, institutional, individual.

### **Future Directions**

- Promote high-quality longitudinal and interventional studies to clarify causal links in oral–systemic relations.

- Develop affordable AI tools validated in diverse populations.

- Expand preventive programs and universal oral healthcare policies.

- Reform educational systems: competency-based curricula, simulation, digital literacy.

- Encourage collaborative research across dentistry, medicine, epidemiology, data science.

- Evaluate cost-effectiveness and implementation models for innovations.

### **Conclusion**

Stomatology today confronts a complex set of evolving challenges: persistent oral disease burdens, deep connections with systemic health, rapid technological change, inequities in access, and the need to modernize education and safety practices. To meet these challenges, the field must embrace integrative, evidence-based, and equity-oriented strategies. By combining translational research, education reform, public health initiatives, and careful innovation adoption, dentistry can fulfill its role in promoting health beyond the oral cavity.

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