EDITORIAL

Breaking boundaries: the growing need for team science in oral health research

Oral diseases, despite being largely preventable, affect over 3.5 billion people globally, posing a significant public health challenge.[1] Oral diseases lead to $710B in treatment costs and productivity losses worldwide each year. Oral diseases are often multifactorial, influenced not only by host factors like genetics and the microbiome, but also by health behaviors and social determinants of health. As improved oral health outcomes increasingly require addressing these complex and multifaceted issues, the need for team science in oral health research becomes more evident. While traditional investigator-driven research remains valuable for addressing specific scientific questions, multi- and interdisciplinary teams with diverse expertise are particularly well suited to confront complex problems, driving transformative and disruptive innovations in the oral health research field.

Multi/interdisciplinarity and the emergence of team science

Although scientific team science has been critical in the development in the evolution of research, a science of team science, identifying the elements of effective science teams, has only emerged as a field in recent decades.[2,3] A driving factor for this development has been the complexity arising from the increased introduction of multidisciplinary research teams, in which multiple disciplines collaborate to approach the same research problem through the lens and language of their respective disciplines. Even greater complexity has emerged with the rise of interdisciplinary teams, where the collaborating disciplines share and integrate mutual understandings of the research agenda to produce more robust and innovative solutions.[3,4] This also means that research teams are increasingly diverse in terms of race, ethnicity, gender, age, language, and professional backgrounds. This diversity contributes unique insights and creativity, and applicability of research findings. The science of team science, which cites research on teamwork from the social sciences and organizational management, continues to refine its approaches to identifying the characteristics of effective teams. Successful scientific teaming shares some commonalities with characteristics of successful teams in other settings – such as effective communication, a foundation of trust, a shared vision, goals, thoughtful leadership, role definition, productivity, and internal cohesion.[2]

Translational teams and the development of team science competencies

In health research, the importance of team science can be well illustrated within the translational science continuum, which seeks to develop optimal ways to move knowledge and findings from research in the lab to dissemination into the population.[5] Cross-disciplinary research teams exist across all stages in the translational research continuum and characterize the translational research landscape – so much so that the National Institutes of Health (NIH) National Center for Advancing Translational Sciences (NCATS) considers the leveraging of team science as one of its eight key principles of effective translational science. But what makes for good team science? Studies of consistent strategies for successful team output[6] among translational teams have identified five key competency domains for teams: facilitating team affect, team communication, managing team research, collaborative program solving, and team leadership.[6,7] Within each of these are both individual (eg, cognitive openness, facilitating awareness, passion, and perseverance, self-awareness in team contexts) and team-based competencies (eg, shared visioning, team learning, role clarification, building trust, meeting management) that can be learned, practiced, observed, and assessed. However, this recent focus on team science competency lacks a clear and agreed upon set of generalizable strategies for their observation and assessment,[8] which continues to be a challenge for moving team development to the forefront of the research enterprise. Despite this, as more research explores these competencies in practice, a greater understanding is emerging of how to better train research leaders and their teams for optimal performance within any field of health research, including oral health research teams.

Building competencies for maximizing outcomes of oral health team science

As we advance in applying team science principles to oral health research, we emphasize the importance of using team science to address and tackle complex oral health research challenges. For example, oral conditions like periodontal diseases are linked to systemic health cardiovascular disease, diabetes, and birth outcomes.[9,10] Understanding the impact of periodontal diseases on systemic health and vice versa and developing interventions for translation requires a multidisciplinary approach, combining the expertise of dental researchers, physicians, microbiologists, geneticists, statisticians, and public health experts. Another example is orofacial pain research, which is highly complex, involving diverse studying factors like neural pathways, inflammation, genetics, psychological influences, and patient behaviors that interplay in the perception and experience of pain.[11] Addressing these intricacies requires multidisciplinary collaboration among neurologists, dental practitioners, psychologists, geneticists, and pain management specialists to develop comprehensive and effective treatment strategies. Furthermore, in recent years, artificial intelligence (AI) has become a fast-growing field offering an emerging adjunct to oral disease screening and risk management. AI has been developed to detect caries and oral pathologies on dental radiographs[12,13] and intraoral images. AI could also transform patient care by enabling precise diagnostics, personalized treatment planning, and predictive analytics. AI research also improves functioning teams.[14] Advancing AI dentistry research, however, demands multidisciplinary team science. Collaboration among dental clinicians, data scientists, engineers, social scientists, and ethicists is crucial to developing AI systems that are clinically relevant, user-friendly, and ethically sound. This line of reach could never be accomplished with the traditional single-lab research setting.

Summary

In summary, federal agencies, such as the National Institute of Dental and Craniofacial Research in the United States, have recognized the shift and emphasized the importance of interdisciplinary approaches in their funding calls, making team science not just a strategic advantage but a funding requirement. Fortunately, the growing field of team science offers valuable insights into building and sustaining highly effective collaborations, setting the stage for a near future where deeply engaged team efforts drive groundbreaking innovations and bring disruptive transformation in oral health care.

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