Improving Dentistry with Behavioral Science

The Case of Implementation Research to Translate Evidence to Practice
Understanding dental caries as a non-communicable disease

Nigel B. Pitts,1,4 Sioune Tweetman,5,4 Julian Fisher1 and Philip D. Marsh4

Abstract
The recent developments in understanding the human oral microbiome and the caries process for evaluation of caries prevention management.

Keywords: Dental caries, non-communicable disease, oral health, prevention, management.

Introduction
Dental caries is a major health problem in industrialized countries, where childhood and adolescence in the Global Burden of Disease estimates was the most common cause of the non-communicable disease burden. New paradigms in caries conceptualization have emerged during the last decades, leading to intense debate and discussion on how to approach the disease, both from a preventive and a therapeutic perspective. Among many new ideas, research discoveries and technologies, one major concept can be highlighted that created a deep frontier between the old and the new paradigm in caries conceptualization: the non-communicable and behavioral disease. This article synthesizes the conceptual construction of dental caries as a non-communicable disease (NCD) based on the current evidence and discusses the appropriate management of the disease in this context. Dental caries has shifted from being considered transmissible and infectious to an ecological and non-communicable disease. Environmental factors such as frequent sugars intake, disrupt the symbiosis of the dental biofilm leading to a dysbiosis, which favors caries lesion initiation and progression. As an NCD, dental caries shares characteristics with other NCDs such as cardiovascular and chronic respiratory diseases, cancer and diabetes, including long duration and slow progression, not being transmissible from person-to-person, being strongly related to behavioral risk factors, and affecting preferentially disadvantaged people. This article presents a perspective of the ecological approach to disease prevention, as a model for understanding and managing dental caries prevention.

1. Nutrition: The role of diet and lifestyle in the development and progression of dental caries.
2. Environment: The influence of environmental factors, such as air pollution and climate change, on dental health.
3. Genetics: The role of genetic factors in the susceptibility to dental caries.
4. Microbiology: The role of oral microbiome in the development and progression of dental caries.
5. Immunology: The role of the immune system in the prevention and treatment of dental caries.

These approaches provide a comprehensive understanding of the complex factors that contribute to the development and progression of dental caries, highlighting the need for multifactorial interventions to effectively manage this non-communicable disease.
Understanding dental caries as a non-communicable disease

Nigel B. Pitts, Síntia Teotucay, Julian Fisher, and Philip D. Marsh

Abstract
The recent developments in the understanding of dental caries as a non-communicable disease (NCD) and the role of common risk factors in its prevention and control have led to the recognition of caries as a complex disease influenced by both genetic and environmental factors. Further, the interaction between these factors and the impact of behavioral and environmental changes on the incidence and prevalence of caries have been emphasized. The identification of these factors has allowed for the development of strategies for the prevention and control of dental caries, leading to a decrease in the burden of this disease worldwide. The understanding of the complex interactions between these factors and the development of effective preventive strategies has been crucial in minimizing the impact of dental caries on public health.

Key points
- Understanding dental caries as a non-communicable disease
- Identification of common risk factors
- Development of strategies for prevention and control

Introduction
Dental caries is a major health problem in many countries, affecting millions of people worldwide. The Global Burden of Disease (GBD) estimates that caries is one of the 20 leading causes of years of life lost, with a global prevalence of 30.9%. The impact of caries on the quality of life and economic burden is significant, as it affects individuals, families, and society. The prevalence of dental caries has increased over the past decades, with higher rates observed in developing countries. The prevalence of caries is highest in young children and adolescents, with a significant impact on their oral health and overall health and well-being. The understanding of the complex interactions between these factors has been crucial in minimizing the impact of dental caries on public health.

Oral Health in America

Advances and Challenges

Reference

Year: 2022
Author: Gicaman, Fernandez, Muñoz-Sandul, Lewin, Garcia-Mantilla, de la Fuente, Valero, and Gazmuri-Teixeiro
Title: "Understanding dental caries as a non-communicable disease: advances and challenges in the management of this complex disease from a public health perspective. Part 1: epidemiological and etiological determinants.
Journal: British Dental Journal
Volume: 222
Issue: 6
Pages: 462-479
DOI: 10.1038/s41415-021-01748-3
Published: 2022

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October 29-30, 2020 // Hosted virtually

VISION

Promote oral health globally by advancing the robust application of behavioral and social sciences

MISSION

Maximize the impact of behavioral and social sciences for the promotion of oral health by building consensus among health scientists and clinicians about essential foci, identifying critical next steps, and fostering transdisciplinary collaboration
Consensus Statement on Future Directions for the Behavioral and Social Sciences in Oral Health

D.W. McNeil1, C.L. Randall2, S. Baker3, B. Borrelli4, J.M. Burgette5, B. Gibson1, L.J. Heaton5, G. Kitsaras6, C. McGrath7, and J.T. Newton8

Abstract
The behavioral and social sciences are central to understanding and addressing oral and craniofacial health, diseases, and conditions. With both basic and applied approaches, behavioral and social sciences are relevant to every discipline in dentistry and all dental, oral, and craniofacial sciences, as well as oral health promotion programs and health care delivery. Key to understanding multilevel, interacting influences on oral health behavior and outcomes, the behavioral and social sciences focus on individuals, families, groups, cultures, systems, societies, regions, and nations. Uniquely positioned to highlight the importance of racial, cultural, and other equity in oral health, the behavioral and social sciences necessitate a focus on both individuals and groups, societal reactions to them related to power, and environmental and other contextual factors. Presented here is a consensus statement that was produced through an iterative feedback process. The statement reflects the current state of knowledge in the behavioral and social oral health sciences and identifies future directions for the field, focusing on 4 key areas: behavioral and social theories and mechanisms related to oral health, use of multiple and novel methodologies in social and behavioral research and practice related to oral health, development and testing of behavioral and social interventions to promote oral health, and dissemination and implementation research for oral health. This statement was endorsed by over 400 individuals and groups from around the world and representing numerous disciplines in oral health and the behavioral and social sciences. Having reached consensus, action is needed to advance and further integrate and translate behavioral and social sciences into oral health research, oral health promotion and health care, and the training of those working to ensure oral health for all.

Keywords: behavioral science, social determinants, psychosocial factors, dental public health, health services research, psychology
1. behavioral and social theories and mechanisms related to oral health

2. use of multiple and novel methodologies in social and behavioral research and practice related to oral health

3. development and testing of behavioral and social interventions to promote oral health

4. dissemination and implementation research for oral health
the behavioral and social sciences are integral to transdisciplinary research and can have an important role in each step of the virtuous cycle of research translation.
Original research variable
Submission 0.5 year Kumar, 1992
Acceptance 0.6 year Kumar, 1992
Publication 0.3 year Poyer, 1982
Bibliographic databases
Reviews, guidelines, textbook 9.3 years
Implementation

"PUBLICATION PATHWAY"

Negative results
Dickersin, 1987
46% Koren, 1989
Lack of numbers
Balas, 1995
35%

Inconsistent indexing
17 years

14%

Balas & Boren, 2000; Westfall et al., 2007
EVIDENCE
What evidence-based practice are you wanting to translate? Is it worth translating?

AUDIENCE
Who is the group(s) targeted for behavior change? Who else is affected? Who has the power to enact change?

TRANSLATION
How can you frame your intervention so it speaks to the needs of your audience? Have you addressed potential barriers? Have you leveraged potential facilitators?

ENGAGEMENT
What are the knowledge, attitudes, beliefs, and norms of your audience?

(Brownson et al., 2013; University of Colorado, 2018)
pain >>>

- distress
- lengthier procedures
- difficulty with behavior guidance
- provider reluctance to treat children

(Wright & Kupietzky, 2014; Zuckerman & Keder, 2015)
the strongest predictor of child-onset dental anxiety is pain

(Carter et al., 2014; Locker et al., 1999; McNeil & Randall, 2014; Seligman et al., 2017; Shim et al., 2015)
Guideline Statement

Management of procedure-related pain in children and adolescents
Paediatrics & Child Health Division, The Royal Australasian College of Physicians

Policy on Pediatric Dental Pain Management

A dental pain provides comprehensive care to children, young people, and adults in the management and treatment of pain associated with dental procedures. This includes a range of procedures such as extractions, fillings, root canals, and other dental treatments. The pain management strategies are focused on minimizing discomfort and enhancing the overall dental experience. The document integrates both pharmacological and nonpharmacological approaches to ensure effective pain control. The document provides guidelines on how to assess, treat, and manage pain in pediatric dental patients, emphasizing the importance of patient education and collaboration between healthcare providers and patients. The aim is to provide a pain-free experience and promote a positive attitude towards dental care in young individuals.
survey of chairs and directors

methods

- cross-sectional survey administered online
- eligibility: US pediatric dentistry department chair or residency director
- analytic approach: descriptive statistics and inductive analysis
survey of chairs and directors

results: participants
- n=41 (62%) chairs, n=61 (64%) directors
- board certified: 88% of chairs, 98% of directors
- years in academic dentistry
  - chairs: $M=21.4$ (SD=11.5)
  - directors: $M=15.4$ (SD=10.3)
- years in current role
  - chairs: $M=7.1$ (SD=5.7)
  - directors: $M=6.5$ (SD=6.1)
survey of chairs and directors

results: approaches and tools taught

<table>
<thead>
<tr>
<th>Approaches</th>
<th>Predoctoral (%)</th>
<th>Residency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical judgement</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Child-rated</td>
<td>93</td>
<td>98</td>
</tr>
<tr>
<td>Parent-rated</td>
<td>56</td>
<td>77</td>
</tr>
<tr>
<td>Behavioral coding</td>
<td>41</td>
<td>48</td>
</tr>
<tr>
<td>Physiologic (e.g., heart rate)</td>
<td>15</td>
<td>36</td>
</tr>
</tbody>
</table>

- tools
  - predoctoral: Wong-Baker (56%), NRS (39%), VAS (27%)
  - residency: Wong-Baker (80%), NRS (72%), VAS (33%)
survey of chairs and directors

results: barriers

- predoctoral
  - lack of curriculum time
  - few clinical opportunities
  - lack of faculty expertise and calibration

- residency
  - lack of time for instruction and clinical use
  - limited faculty observation/enforcement
  - lack of faculty calibration
survey of chairs and directors

results: facilitators

- predoctoral
  - student clinical experience
  - Availability of scripts and demonstration materials
  - interdepartmental collaboration

- residency
  - clinical experience
  - direct observation by faculty
  - clear institutional guidelines
so, where to from here?
acknowledgements

International Association for Dental Research
National Institute of Dental and Craniofacial Research
Daniel W. McNeil, PhD, the Summit Steering Committee
Nicholas Jakubovics, PhD, Sarah R. Baker, PhD

National Institute of Dental and Craniofacial Research (T90 DE021984 + K23 DE028906)
Donald L. Chi, DDS, PhD, Bryan Weiner, PhD, Tonya Palermo, PhD, Mary Northridge, MPH, PhD

Cameron L. Randall, PhD
CLR333@uw.edu | 206.616.1617
www.cameronlrandall.com | @cameronlrandall