

10.9 The ICF and oral health

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Introduction: functioning, disability and oral health

Oral diseases have a substantial impact on the wellbeing of individuals and populations because of several special features of the structure and function of the mouth. From an early age, the mouth and face have powerful influences on psychological wellbeing and social interactions. Craniofacial conditions such as facial clefts, although rare, have profound psychological and sociological significance for children and families. The ability of dental decay to cause excruciating pain has been recognised since antiquity, and toothache continues to be a highly prevalent and disabling condition, even in an era of modern dental care. Although conditions such as dental decay, gum disease, dry mouth and tooth loss have much more subtle impacts on wellbeing, they are highly prevalent and hence contribute to a substantial burden of oral disease within the Australian population. In 1996, dental caries, complete tooth loss and periodontal disease featured among the five most prevalent conditions in the Australian population (AIHW 2002c).

For many individuals, the impact of oral conditions on wellbeing is a private experience, endured from day to day. Yet this 'silent suffering' creates a substantial impact on the population. For example, in her introduction to the US Surgeon General's Report on Oral Health, Donna E. Shalala, (then) Secretary of Health and Human Services declared, '...oral health problems can lead to needless pain and suffering, causing devastating complications to an individual's wellbeing, with financial and social costs that significantly diminish quality of life and burden American society' (US Department of Health and Human Services 2000). Documentation of the population burden of oral disease has become possible only in the last decade, as dentistry has developed research methods to assess more comprehensively the nature and consequences of oral disease. Much of the research has been stimulated by the WHO's development, first, of the ICIDH (WHO 1980) and, more recently, the ICF (WHO 2001)

The purpose of this section is to review the conceptual and methodological approaches to measuring oral health within the evolving frameworks of the ICIDH and ICF. Recent findings are presented from national surveys

conducted among the Australian and UK populations. The section concludes with recommendations for assessment of oral health using the ICF framework.

Measures of oral health using ICDH and ICF frameworks

Since the early twentieth century, dental researchers have made detailed epidemiological assessments of oral health using a predominantly clinical focus on disease and tissue destruction. For example, Dean and colleagues in the United States Public Health Service developed the DMF index in their groundbreaking studies of the relationship between dental decay and levels of fluoride in drinking water (Dean et al. 1942). The DMF index, a measure of a person's history of dental decay, is recorded by a trained dental clinician who examines the teeth of study subjects for clinical signs of decay (D), previous treatment of decay by a filling (F) or previous extraction due to decay, leaving a missing (M) tooth. There are comparable clinical indices that measure gingival inflammation, periodontal tissue destruction, dental trauma, occlusal (orthodontic) irregularities, and temporomandibular disorders.

By the 1970s, in response to broader concerns that many clinical indices of general health status were not responsive to population measures of health service provision, Cohen & Jago (1976) advocated the development of 'sociodental' indicators to capture non-clinical aspects of oral disease. They argued that sociodental indicators were necessary to broaden the narrow focus that had emerged within oral epidemiology, which emphasised only the clinical parameters of disease, and therefore failed to document the full impact of oral disorders within populations.

The ICDH (WHO 1980) provided the impetus for a revolution in the conceptual basis and empirical methods for evaluating oral health. In his application of the ICDH framework to oral health, Locker (1988) proposed a framework for measuring oral health that extended beyond the confines of clinical indices of disease activity and tissue destruction embodied in the DMF index. Importantly, Locker's model also expanded the scope of ICDH to include certain feeling states (e.g. pain and psychological discomfort) which are prominent consequences of oral disease. Locker also elucidated subcategories of the ICDH definition of disability, describing concepts of physical disability, psychological disability and social disability. It is an intriguing footnote to history to observe that some of those same concepts have now been embodied in the ICF definitions of Activities and Participation and that pain (previously excluded from ICDH) has now been classified as a Body Function within the ICF. Specific references to the oral cavity within the current ICF classification (WHO 2001) occur for seven body functions (b28010, b5100–b5105) and five Body Structures (s3200–s3204). The mouth and face are involved directly in six forms of Activities and Participation (d330, d5201, d550, d560, d5701, and d7105).

These theoretical developments were matched by a surge in methodological work by researchers around the world who developed instruments to measure oral health and its consequences. Researchers from different countries used various phrases to describe the underlying concepts being measured, including 'social impact of oral disease', 'subjective oral health status', 'oral health related quality of life' or simply 'oral health'. However all of the questionnaires captured, to varying degrees,

concepts described in the ICIDH (WHO 1980), Locker's refinement of the ICIDH for oral health (Locker 1988) and, as it turns out, the ICF (WHO 2001). By 1996, when the first international conference for methodological research in this area was held, no fewer than eleven standardised questionnaires had been developed and undergone testing for reliability and validity (Slade 1997a). In a subsequent international conference, new measures of oral health were described that were targeted towards young children and specific clinical conditions such as dry mouth and oral cancer (Inglehart & Bagramian 2002).

While it is beyond the scope of this section to review all of the measures described above, Table 10.6 summarises the features of questionnaires that assess multiple dimensions of oral health described in ICIDH/ICF frameworks and which have been used in clinical research or population studies. Questionnaires range in length, from 3 to 56 items and consequently they vary in the scope of dimensions measured. Although not shown in Table 10.4, most of the questionnaires inquire about the negative consequences of poor oral health, and hence are consistent with the orientation of the ICIDH. However, the Dental Impact Profile (Strauss & Hunt 1993) and UK Oral Health Related Quality of Life questionnaire (McGrath & Bedi 2001) ask about positive and negative consequences of oral status, as embodied in the ICF.

Examples of results from studies that have measured oral health within an ICIDH/ICF framework

In a review of 14 cross-sectional studies of adults, Slade (2002) reported that the following factors consistently have been associated with poorer subjective oral health status: fewer teeth, more diseased teeth, more extensive periodontal disease, other untreated dental conditions, unmet treatment needs, a pattern of episodic/emergency dental visits to treat dental problems, and lower socioeconomic status. In the US, non-whites generally report poorer oral health compared with whites. Slade (2002) also reviewed five clinical studies in which improvements in subjective oral health were found following general dental treatment, replacement of missing teeth, treatment of temporomandibular (jaw joint) disorders, and surgical treatment for oral cancer.

One of the most comprehensive measures of oral health status, the 49-item Oral Health Impact Profile (OHIP), was developed in Australia (Slade & Spencer 1994a). A shorter, 14-item version OHIP-14 questionnaire has also been developed (Slade 1997b). OHIP questionnaires have been used to assess oral health in 25 studies, ranging from international comparative population surveys through to randomised clinical trials. For example, in a study of community-dwelling South Australians aged 60+ years, 6.6% of those who had one or more teeth reported that they had experienced discomfort while eating because of problems with their teeth, mouth or dentures (Slade & Spencer 1994b). Other impacts reported by at least 10% of people with teeth included difficulty chewing and avoidance of foods; under 5% reported adverse impacts of oral health on social roles and interpersonal relationships. However, people with no remaining natural teeth were approximately twice as likely to report these impacts. In a 2 year follow-up of people who had one or more teeth,

Slade (1998) found deterioration in reported oral health status among three hypothesised high risk groups: people who experienced tooth loss during the two-year period; people who usually visited the dentist because they had problems; and people who reported financial hardship in obtaining dental care.

A comparison of OHIP responses among older adults in South Australia, Ontario (Canada) and North Carolina (US), found that tooth loss was consistently associated with high OHIP scores, indicating more frequent adverse impacts on oral health (Slade et al. 1996). Interestingly, there were larger differences in OHIP scores between whites and African-Americans within the US sample than between the three countries, and while those differences diminished in multivariate analyses that controlled for clinical measures and dental visits, African-Americans continued to have the highest levels of impact. This finding lends support to the ICF framework by suggesting that socioenvironmental factors (e.g. social and cultural influences) influence oral health and its social impact. Furthermore, the results indicate the effects of social and cultural diversity may be greater between race groups in North Carolina than between the other countries studied. Consequently, these results lend support to the expanded conceptual model of ICF, in which socioenvironmental factors (i.e. people's living circumstances) interact with the personal dimensions of functioning and disability.

Other researchers have used the OHIP to compare subjective oral health status and generic health status, with the results suggesting that oral health is perceived as a distinct dimension within general health. For example, in a study of adolescents in New Jersey, Broder et al. (2000) found only weak to moderate correlations between OHIP scores and the SF-36, a widely used measure of subjective health status. Importantly, the SF-36 was not associated with clinical oral status, whereas the OHIP was. Nonetheless, the OHIP was not intended to serve as a screening tool for identification of dental treatment needs, and a study of Canadian adults found that it had poor sensitivity and specificity in predicting the need for dental restorations, periodontal (gum) treatment and dentures (Locker & Jokovic 1996). In two clinical trials comparing treatment for complete tooth loss using the OHIP questionnaire, patients receiving implant-retained dentures had significantly greater improvements in subjective oral health status than patients receiving conventional dentures (Allen et al. 2001; Awad et al. 2000).

Recent findings from national surveys of oral health using the OHIP

The short version OHIP-14 questionnaire has been used in two recent surveys of samples representative of the adult populations in Australia and the UK. This permitted for the first time, a comparison of subjective oral health status between representative populations using a standardised, multiple-item instrument. The prevalence of adverse impacts among dentate adults was markedly similar in the two populations, with 18.2% of the Australian sample and 15.9% of the UK sample experiencing one or more items 'fairly often' or 'very often' during the preceding year. In fact, regional variation in prevalence within the samples was greater than that between the two populations.

Conspicuous in the Australian sample was the significantly greater impact reported by people with no natural teeth remaining (23.9%). Although the prevalence of impacts varied only marginally between populations, dentate Australians reported a significantly greater mean number of impacts and perceived greater severity of impacts than their UK counterparts as measured by the sum of affirmative responses to items. The higher impact response of Australians was not distributed equally across all items, but rather was centred on two specific dimensions categorised as pain (aching, pain on eating) and physical disability (diet unsatisfactory, interrupted meals). The former is classified as a domain of the Body Function component within ICF, and the latter is consistent with the Activities/Participation and Body Function components of the framework.

Tooth loss was associated with subjective oral health deficits in both populations and was independent from the effect of age. However, the relationship between tooth loss and impact was neither monotonic nor consistent between populations. In the Australian sample, retention of 25 or more teeth was associated with significantly less impact, whereas in the UK a decreasing gradient in impact was observed with increasing levels of tooth retention past a threshold of 16 teeth (Figure 10.3). The effect of social and cultural determinants on outcomes was apparent when the Australian sample was categorised according to country of birth (Australia, UK/Ireland, other). Investigation of age and tooth loss associations with OHIP scores for immigrants born in the UK and Ireland revealed almost identical patterns to those observed in the resident UK population. Despite substantial progress in the field of health inequalities, the reasons for such cultural differences and the role of social factors in their development remain to be clarified.

Recently, data from the UK survey were used to evaluate the potential causal pathway among dimensions of oral health defined in Locker's theoretical model (Locker 1988), on which the OHIP was based. Consistent with the ICIDH, Locker's model proposed a series of links connecting dimensions of oral health in a hierarchy, beginning with impairment, and progressing to more debilitating impacts of functional limitation, discomfort and pain, through to disability, and ultimately to handicap. Examination of the combination of survey responses generally supported Locker's model with the majority of response patterns conforming to the theoretical hierarchy. This was not the case however for 10.3% of adults. In almost all of these cases, responses included pain and discomfort *in addition to* functional limitation, indicating a pathway that was not delineated in Locker's model. Accordingly, pathways were revised to omit combinations of dimensions that were not prominent in both the Australian and UK population, and incorporate those reported combinations that were unspecified in Locker's hierarchy. The latter comprised Impairment with Disability, Functional Limitation with Pain or Discomfort, and Pain or Discomfort with Handicap. The modified model highlights the pivotal role of pain in escalating the impact of oral conditions to more debilitating levels. While Functional Limitation alone was not causally linked to Disability or Handicap, in the

presence of pain or discomfort, lower grade impacts could advance to these more serious threats to wellbeing.

This finding has implications for tertiary prevention interventions that target symptomatic conditions to avert disability or handicap. For example, if these same patterns of subjective oral health observed in national cross-sectional studies could be confirmed to have causal associations, it would suggest that many aspects of diminished oral function are self-limiting in the absence of pain. Furthermore, as a 'case study' of the WHO theoretical framework of health, these results from oral health imply that pain may play a central role in mediating transitions among subcategories of the ICF domains of Activities and Participation.

Conclusions

In the last decade, significant progress has been made in measuring oral health within an ICIDH/ICF framework.

- The OHIP is one of the few measures of oral health that incorporates the social dimension of health thoroughly. Historically it has used the ICIDH conceptual structure and remains well aligned to the new concepts of the ICF.
- The OHIP-14 has been used effectively to measure adverse impacts of oral health on wellbeing in national population surveys.
- The population distribution of conceptual dimensions within the OHIP suggests that oral pain plays a central role in mediating transitions among subcategories of the ICF domains of Activities and Participation.
- New work is under way to develop measures suitable for children and other population subgroups
- While some other questionnaires of subjective oral health have captured positive dimensions, they have not been adopted so widely, and methodological problems in measuring both positive and negative consequences using those questionnaires need to be resolved.
- Additional work is needed to move beyond classification and quantification in population health surveys to evaluate interventions that may improve health outcomes captured in an ICF framework.

Table 10.6: Questionnaires measuring subjective oral health status

| Questionnaire (authors) | Dimensions measured | No. of questions |
|---|--|------------------|
| Sociodental Scale (Cushing et al. 1986) | Chewing, talking, smiling, laughing, pain, appearance | 14 |
| RAND Dental Health Index (Dolan et al. 1991) | Pain, worry, conversation | 3 |
| General Oral Health Assessment Index (Atchison & Dolan 1990) | Chewing, eating, social contacts, appearance, pain, worry, self-consciousness | 12 |
| Dental Impact Profile (Strauss & Hunt 1993) | Appearance, eating, speech, confidence, happiness, social life, relationships | 25 |
| Oral Health Impact Profile (Slade & Spencer 1994a) | Function, pain, physical disability, psychological disability, social disability, handicap* | 49 |
| Subjective Oral Health Status Indicators (Locker & Miller 1994) | Chewing, speaking, symptoms, eating, communication, social relations | 42 |
| Oral Health Quality of Life Inventory (Cornell et al. 1997) | Oral health, nutrition, self-rated oral health, overall quality of life | 56 |
| Dental Impact on Daily Living (Leao & Sheiham 1996) | Comfort, appearance, pain, daily activities, eating | 36 |
| Oral Health-Related Quality of Life (Kressin et al. 1996) | Daily activities, social activities, conversation | 3 |
| Oral Impacts on Daily Performances (Adulyanon et al. 1996) | Performance in eating, speaking, oral hygiene sleeping, appearance, emotion | 9 |
| UK Oral Health Related Quality of Life questionnaire OHQoL-UK(W)© (McGrath & Bedi 2001) | Eating, appearance, speech, breath odour, social life, romantic relationships, confidence, sleep, mood | 16 |

Note: Slade and Spencer defined 'handicap' based on the framework described for ICIDH (WHO 1980). With the publication of the ICF framework (WHO 2001), the terms 'Activities and Participation' replace the formerly used terms 'impairment', 'disability' and 'handicap'.

