Chronic Disease Management and Oral Health

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Overview

- Oral health and general health
- Diabetes and oral health
- Cardiovascular Disease and oral health
- Other oral conditions
- Management of patients with chronic disease
- Dental services & referral
To discuss:

- the impact of oral diseases (particularly periodontal disease) on existing systemic conditions

- periodontitis as a possible risk factor for specific systemic diseases

- Partnership between Dental Health Professionals & Medical Health Professionals
“A standard of health of the oral and related structures which enable an individual to eat, speak and socialize without active disease, discomfort or embarrassment, and which contribute to general well being”.

Source: The United Kingdom Oral Health Strategy Group, 1994
Oral Diseases

- dental caries
- periodontal disease
- oral cancer
- other
Oral health and general health

• Good oral health is an essential part of general health and wellbeing.

• It is vital for people with diabetes to have healthy teeth and gums in order to eat and in particular chew a wide variety of healthy foods.

• Teeth that are sore or loose in your gums make it difficult to eat a healthy diet.
The most common oral health problems associated with diabetes are:

- Periodontal (gum) disease
- Dental Caries (tooth decay)
- Candida fungal infections
- Infection and delayed healing
- Dry mouth
- Taste impairment
The long term systemic complications of diabetes are largely related to changes in the large and small blood vessels which increase the risk of:

1. Heart disease and stroke
2. Foot ulceration, gangrene and lower limb amputation
3. Renal failure
4. Visual impairment
5. Neuropathy
6. Periodontal disease

Approximately 1 in 4 Australian adults has a moderate or severe form of periodontal disease usually diagnosed in people in their late 30’s and 40’s (AIHW, 2007).

Prevalence of periodontitis in the adult population is 24.2%
- 18-24 year olds is 2.8%
- Over 75 year olds is 60.8%

Two of the major risk factors for the development of periodontitis include
- Smoking
- Poorly controlled diabetes

Healthy mouth

- Pink smooth mucous membranes (inside of lips, cheeks and palate)
- Pink stippled gums
- White teeth free of plaque
- Well adapted to the tissues
- Knife edge margins
Healthy Periodontium

The periodontium - tissues around the teeth consists of:

- The gingivae
- Epithelial attachment
- Connective tissue
- Attachment (periodontal ligament & cementum)
- The alveolar process
Gingivitis

- The most common gum disease caused by bacteria found in plaque >50% adults
  63% 14-17 year olds

- Plaque is a biofilm

- Causes red, swollen gums that may bleed when brushing or flossing

- Gingivitis may be exacerbated by
  - Pregnancy
  - Puberty
  - Menstrual cycle
  - Diabetes

Gingival bleeding
Diabetes and Gingivitis

- People with type 1 diabetes have a greater risk of developing gingivitis.

- Type 2 diabetes is also associated with gingivitis that may be related to glycaemic control (Ryan & Kamar 2003).
Figure 2-6. Free and Attached Gingiva
Periodontal probe
Periodontal disease literally means disease that involves the tissues around the tooth.

The tooth remains undamaged but the structures around it may be damaged to such an extent that the tooth becomes loose and falls out.
General Signs and Symptoms of Periodontal Disease

- Swollen, tender, red gums
- Bleeding while brushing, flossing or eating
- Gum recession
- Loss of bone supporting teeth
- Persistent halitosis
- Spaces and gaps developing between teeth
- Potential for plaque and tartar to build up under gum line
- Loose teeth
- Gum infections leading to abscesses

By the time these serious complications are experienced the disease is usually at a very late stage and can be difficult to treat and reverse.
Periodontal Disease
Periodontal Disease
Diabetes and Periodontal Disease

- Epidemiological studies have confirmed that patients with diabetes, both type 1 and type 2, are more susceptible to periodontal diseases.

- Evidence of Adverse Effects of Diabetes on Periodontal Health

- Between 1967 – 2010, 89 studies
  - 30 countries
  - 79 showed diabetes adversely affects periodontal disease

• The extent of the risk is modified by duration of diabetes and glycemic control. The risk increases markedly when diabetes is poorly controlled.

The effect of bacteria on plaque on the periodontum depends on:

1. The type of bacteria
2. The amount of plaque
3. The resistance of the patient
The biological mechanisms that have been proposed to explain the association between diabetes and periodontal disease include:

- Up regulated inflammatory response (AGE/RAGE)
- Uncoupling of bone resorption and bone formation leading to net bone loss
- Alteration in collagen synthesis and degradation (impaired wound healing)
- Degenerative vascular changes (micro-angiopathy)
- Alterations in gingival crevicular fluid with high levels of glucose and inflammatory mediators
- Altered subgingival micro-flora (controversial)
- Hereditary predisposition
• Research suggests that the relationship between periodontal disease and diabetes goes both ways – not only does diabetes adversely affect periodontal disease, but periodontal disease may lead to a worsening of diabetes or glycemic control.

Periodontal Infection Adversely Affecting Glycemic Control

The evidence

- Small number of observational studies

- More direct evidence from treatment studies using non-surgical periodontal treatment

- Simpson et al, 2010 Cochrane Review analysed RCT’s of people with Type 1 & Type 2 diabetes who had been diagnosed with periodontal disease.
  - 7 studies met the inclusion of the 690 papers reviewed – criteria
  - Conclusion:
    - Treatment of periodontal disease can reduce blood sugar levels in type 2 diabetes
    - Average decrease of HbA1c 0.4%
    - Not enough available evidence to support the same benefit in type 1 diabetes
Conceptual Model linking Periodontitis, Insulin Resistance & Systemic Illness

Chronic Inflammation: Periodontitis

- Pro-inflammatory state, with chronic overexpression of cytokines
  - 1L-1β
  - 1L - 6
  - TNFα

Liver

Insulin resistance

Acute phase response (CRP, fibrinogen, PAI-1)

Diabetes
Glycemic Control
Coronary Heart Disease

Pancreatic Beta Cell Damage

Empirical Evidence from Observational Studies

- Demmer et al (2008) in the USA concluded that having periodontal disease was significantly associated with a greater risk of developing Type 2 diabetes after controlling for other established risk factors.

- Ide et al (2011)
  - 5848 middle-aged non diabetic Japanese civil servants
  - Followed 6.5 years
  - The investigators found no association between the development of diabetes although there is an increased risk.
• Periodontal abscess
• Pericoronal infection (pericoronitis)
• Acute ulcerative gingivitis
• A periodontal abscess is seen almost exclusively in patients with existing periodontal disease and/or uncontrolled diabetes.

• The discomfort associated with the abscess is usually not enough to keep the patient awake at night.

• Pain is often difficult to localise.

• Treatment requires direct mechanical/surgical access to clean the tooth roots of any plaque and calculus. In advanced cases extraction may be considered.

• If systemic signs and symptoms are present, or if the patient is not responding to local treatment antibiotic therapy should be considered.
Acute Periodontal Abscess

FIGURE 25–1  Acute periodontal abscess. This abscess is associated with tooth #8, and shows obvious signs of redness and swelling. (Courtesy Philip R. Melnick, DMD.)
Acute ulcerative gingivitis
Holmlund, et al (2010) have recently demonstrated a 7-fold increased risk for mortality due to Coronary Heart Disease in subjects with <10 teeth compared to those with >25 teeth.

Severity of periodontal disease, number of deepened periodontal pockets and bleeding gums on probing were not related to mortality in a dose-dependent manner after adjustment for confounders.

They concluded that:

- this fairly large (7,674 subjects) prospective study with a long follow-up period (1976-2002) presents for the first time a dose-dependent relationship between number of teeth and Cardiovascular Disease (CVD) mortality, indicating a link between oral health and CVD, and
- that the number of teeth is a proper indicator for oral health in this respect.
• CVD accounts for around 40% of all deaths
  – atherosclerosis the underlying etiology

• Infection and inflammation play a key role in the initiation and progression of atherosclerosis

• Individuals with severe chronic periodontitis have a significantly increased risk of developing CVD including
  – Atherosclerosis
  – Myocardial infarction
  – Stroke
The four most prominent Chronic Diseases –

- cardiovascular diseases,
- diabetes,
- cancer and
- chronic obstructive pulmonary diseases – share common risk factors with oral diseases that are lifestyle related and preventable.

A major benefit of the common risk factor approach is the focus on improving health conditions for the whole population...

Theories

- Inflammation
- Infection
- Auto-Immunity
- Broad Relationship
Definition:

“the destruction of tooth tissue resulting from a complex interaction of bacteria, diet and host factors”.

- About 25% of Australian adults have untreated decay
- Risk groups are present
- Holes in teeth are end result of disease process
Dental caries is a diet related, infectious and transmissible disease affecting the teeth.

It requires the presence of:

- susceptible teeth
- cariogenic bacteria [oral bacteria that causes dental decay (Mutans streptococci & Lactobaccilli)]
- diet high in refined carbohydrates (cariogenic diet) with frequent exposures
Microorganisms

Teeth

Fermentable carbohydrates

TIME

no caries

no caries

no caries

Saliva

Dental Caries

Multifactorial disease including:

- Tooth/Teeth
- Bacterial dental plaque
- Fermentable carbohydrates
- Acidic foods and drinks
- Time
- Saliva
According to Ambulatory Care Sensitive Conditions (ACSC) data, dental conditions are ranked as the second most common cause of hospital admissions in Victoria behind diabetes complications (DHS, 2008-9)
Dental ACSC by Age (2008-09) - Victoria

No. of Admissions

Age

00-04
05-09
10-14
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+

0
500
1000
1500
2000
2500
3000
## The cost of oral disease

<table>
<thead>
<tr>
<th>Medical spending 2007-08</th>
<th>Dental spending 2007-08</th>
</tr>
</thead>
<tbody>
<tr>
<td>$18.3 billion</td>
<td>$6.1 billion</td>
</tr>
<tr>
<td>12% funded by individuals (Medicare copayments)</td>
<td>65% funded by individuals</td>
</tr>
<tr>
<td>78% funded by the Australian Government</td>
<td>20% funded by governments</td>
</tr>
<tr>
<td>4% health insurance funds</td>
<td>15% health insurance funds</td>
</tr>
<tr>
<td>6% other non-government funding</td>
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Source: Health Expenditure Australia 2007-08, AIHW 2009.
Osteonecrosis of Jaws (ONJ)

Incidence (recent data)

Oral bisphosphonates

-1% incidence, usually after 2-3 years of continuous usage

IV bisphosphonates

-8-9% incidence
The jaw bone is now **non-vital**
If soft tissue envelope is thin, then bone may become exposed:

- Microtrauma
- Normal function
- Dental treatment
- Exposed bone become colonized by oral micro-flora

To date this type of osteonecrosis has almost exclusively been reported in oral cavity
Spontaneous Osteonecrosis of Jaws (ONJ)

Incidence (recent data)

Oral bisphosphonates
Mavrokokki, et al. (2007):
- 0.05-0.1%

by "Merck" (2006):
- 0.7/100.00 person/years of exposure

IV bisphosphonates
Mavrokokki, et al. (2007):
- 0.88-1.15%
## Risk of osteonecrosis of the jaws in patients taking bisphosphonates

<table>
<thead>
<tr>
<th></th>
<th>Risk of osteonecrosis of the jaws [NB2]</th>
<th>Risk of osteonecrosis of the jaws if having an extraction [NB2]</th>
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<tbody>
<tr>
<td>All patients taking bisphosphonates</td>
<td>0.05%-0.10%</td>
<td>0.37%-0.80%</td>
</tr>
<tr>
<td>Patients with osteoporosis</td>
<td>0.01%-0.04%</td>
<td>0.09%-0.34%</td>
</tr>
<tr>
<td>Patients with Paget’s disease</td>
<td>0.26%-1.8%</td>
<td>2.1%-13.5%</td>
</tr>
<tr>
<td>Patients with malignancy</td>
<td>0.88%-1.15%</td>
<td>6.67%-9.1%</td>
</tr>
</tbody>
</table>

Table has been adapted from Mavrokokki A, Cheng A, Stein B, Goss A. The nature and frequency of bisphosphonate associated osteonecrosis of the jaws in Australia. J Oral Maxillofac Surg.

NB2: The risk increases with increasing age of patient, increasing time of taking the bisphosphonate, and increasing potency of the bisphosphonate. The risk is higher in patients with immunological compromise (eg corticosteroids, type 1 diabetes).

Source: Oral and Dental Therapeutic Guidelines, (ADA), Version 1, 2007)
Bisphosphonates

Signs and Symptoms

Pain
Swelling
Purulent discharge
Non-healing extraction socket
Exposed alveolar bone
Progression to sequestrum formation
• **Stage 3**

**Antibiotic** if clinical exacerbation of infection

**Minimal** bony debridement

**Only** remove sharp exposed bone which irritates tissues

**Do not** remove bone at the exposed margins

**Do not** raise a flap
Prior to commencement of bisphosphonate therapy

Educate the patient (including informed consent)

Remove non-restorable teeth, complete all invasive procedures

Restore carious teeth

Eliminate periodontal problems

Assess, adjust dentures

If systemic condition permit, postpone bisphosphonate treatment until wound epithelized (21 days)
• 1,200 Australians p.a. diagnosed with oral cancer.

• 50% survival rate at five years, rising to 80% survival rate at five years with early diagnosis.

• Smoking is estimated to account for 75% of oral cancer cases.

• Many parts of the mouth can be affected, most commonly the tongue, floor of the mouth, lips and cheeks.
• Colour changes
  – white
  – Red
  – Speckled

• Non healing ulcers

• Within other diseases
  – Lichen Planus
  – Chronic Candidiasis
Other Etiology

- Human Papilloma Virus
- Betal Nuts
- Alcohol
Chronic conditions

- Risk factors
  - Diet
  - Stress
  - Oral hygiene

- Risk factors
  - Lifestyle
  - Smoking
  - Drugs & Alcohol
  - Injuries

- Obesity
- Diabetes
- Oral cancer
- Heart disease
- Respiratory disease
- Dental caries
- Periodontal disease
- Trauma

Risk factors include diet, stress, oral hygiene, lifestyle, smoking, drugs & alcohol, and injuries. Chronic conditions such as obesity, diabetes, oral cancer, heart disease, respiratory disease, dental caries, periodontal disease, and trauma are connected through these risk factors.
Emerging population evidence suggests associations between oral health and 6 systemic diseases

**Diabetes**

**Cancers**

**Cardiovascular diseases**

**Respiratory diseases**

**Preterm and low weight births**

**Rheumatoid arthritis**
Systemic diseases with oral manifestations

- Gastroesophageal reflux disease
- Diabetes
- Multiple myeloma
- Ulcerative colitis
- Anaemia
- Kawasaki disease
- Systemic lupus erythematosus
- Rheumatoid arthritis
- HIV
Gingival hyperplasia
Dry mouth
Lichen planus
Aphthous stomatitis
Salivary gland swelling & pain
Candidiasis
Disturbed taste
Mucositis
Mucositis
Tooth discolouration
Mucosal pigmentation
Dry mouth is the condition of not having enough saliva

Common causes include:
- A side affect of many medicines (anything that starts with anti)
- A complication of diseases such as diabetes
- Cancer treatment such as radiation therapy or chemotherapy (if directed at the head and neck)

Treatment:
- Depends on the cause and severity
- Artificial saliva is available as a rinse, spray or gel
- Fluoride treatments may be recommended to prevent dental caries
- Tooth Mousse
- Pilocarpine
Medications reducing salivary flow

Cardiovascular medications (diuretics, calcium channel blockers)

Antidepressants and antipsychotics

Sedatives

Central analgesics

Anti-Parkinson’s disease medications

Anti-allergy medications

Antacids
• The mouth is part of the body - checking oral health is not just for dentists
• Oral health is not just about teeth
• Prior to surgery, teeth and gums to be checked
• Prior to and during aged-care domicile, teeth and gums to be checked (aspiration pneumonia)
• Consider oral health impact of medications
• Consider the oral impact of systemic disorders
Many systemic diseases have oral manifestations

Collaborative work of physicians with dentists in patient care and research

Medical implications of periodontitis

Adverse drug reactions in the mouth are common

Health carers as oral health promoters:
- Reductions of inequalities in oral health
- Oral cancer detection
- Opportune patient referral to dentists
- Patient counselling in oral health
- Administration of topical fluorides in selected cases

Pregnancy complications:
- low birth weight
- preterm delivery
- preeclampsia

Poor glycaemic control in diabetes

Acute respiratory conditions in COPD

Increased risk for cardiovascular disease

• Encourage patients with Chronic Diseases to have a full oral health check

• Work closely with your local public and private dental providers to ascertain eligibility criteria and referral pathways to dental services.

• Check the mouth on the way to tonsils

• Be suspicious
Oral health has the potential to affect the health and wellbeing of a pregnant woman as well as that of her unborn baby. Studies have shown an association between:

- The level of periodontitis in pregnant women and adverse pregnancy outcomes, such as preterm birth, low birth weight, or both

Source: Clothier et al, 2007; Wimmer and Pihlstrom, 2008)
- moderate to severe periodontitis in early pregnancy and an increased risk of spontaneous preterm birth, independent of other traditional risk factors (Jeffcoat et al, 2001; Offenbacher et al, 2006)

- maternal periodontal health and higher incidence of preeclampsia (Canakci et al, 2004)

Source: Jeffcoat et al, 2001; Offenbacher et al, 2006

Canakci et al, 2004
Pregnancy & Periodontal Disease

- Pregnancy Gingivitis + Epulis – Plaque induced inflammation of the gums resulting from bacterial infection
- Prevalence 30 – 100% of pregnant women
- Moderate to severe periodontitis 15% of women in the first trimester
- 25% of women have a worsening periodontal condition during pregnancy
- Proposed mechanism:
- Fluctuations in progesterone and oestrogen levels leading to
  - Increased vascular permeability
  - Alterations in oral biofilm
  - Changes in the nature and quality of the host response
Since 1996 studies have linked periodontal disease and pregnancy complications
- Almost 50% of mothers delivering Pre-term births (PTB) have none of the known risk factors
- Some intervention studies have demonstrated a reduction in adverse outcomes following periodontal treatment
- Lopez et al (2002) 1.8% of treated women had a PTB compared to 10.1% in the delayed treatment group
- Polyzos et al (2009) Meta analysis of seven RCT’s found treatment reduced PTB
- Not all treatment studies have shown this and larger more rigorous studies required
Eligible Population for public dental services

Children & young people
- All children aged 0-12 years
- Young people aged 13-17 years (health care or pensioner concession card holders or dependants of concession card holders)

Adults
- People aged 18 years and over (health care or pensioner concession card holders or dependants of concession card holders)

Tel: 1300 360 054 or visit www.dhsv.org.au
Marked inequalities in oral health – lower socio economic backgrounds, CALD and rural communities

The following groups have priority access to dental care and may not need to go onto a waiting list

- Aboriginal & Torres Straight Islanders
- Refugees and asylum seekers
- Pregnant women (concession card holders)
- Homeless people
- Registered clients of mental health and disability services
- Medical referrals
Conclusions

Associations have been demonstrated that imply that dentate adults with periodontal disease are at a greater risk of having:

- cardiovascular disease,
- Complications of diabetes, and
- preterm low birth weight babies.
Private dentists are listed in the telephone directory’s Yellow Pages (under ‘Dentists’)

The Australian Dental Association (Victorian Branch) can also provide information

www.adavb.net
Tel: (03) 8825 4600
Further information

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