CLINICAL RECOMMENDATIONS: ORAL CARE OF THE PAEDIATRIC ONCOLOGY PATIENT

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October 2010

1. Introduction

This clinical practice guideline is based on a review of the current dental and medical literature related to dental management of paediatric oncology patients receiving chemotherapy and/or radiotherapy. A MEDLINE search was conducted using the terms "dental management of pediatric oncology patients", "dental management of pediatric cancer patients", "oral care and pediatric cancer", "oral care and pediatric oncology", "chemotherapy and oral mucositis" and "radiotherapy and stomatitis". Expert opinion and best practice advice was also sought from consultant staff at the RCH Children's Cancer Centre in the development of this guideline. In addition, international paediatric dental and oncology organisations with similar guidelines were accessed for contemporary recommendations[1-3].

2. Background

Childhood cancer accounts for approximately 1% of all cancer cases in the population. In Australia, the annual incidence rate of malignant tumours in children under 15 years is approximately 13.8 per 100,000 children[4]. Approximately 600-700 children aged between birth and 15 years develop cancer each year in Australia[5]. Whereas most adult cancers are carcinomas with strong aetiological associations, childhood cancers derive from a wide range of different histological types of tumour with less aetiological connection.

The incidence, either of childhood cancer as a whole or of individual types of cancer, varies little from one country to the next and no racial group is exempt. There are more than 50 types of childhood cancers; the most common forms include leukaemias, lymphomas, central nervous system tumours, primary sarcomas of bone and soft tissues, Wilms' tumours, neuroblastomas and retinoblastomas. Acute leukaemias and tumours of the central nervous system account for approximately one-half of all childhood malignancies. Multimodal therapy (chemotherapy, radiotherapy and surgery) has resulted in an overall 5 year survival rate for childhood cancer of approximately 75%[6].

3. Rationale

Close collaboration between the child's oncologist and the paediatric dentist is essential when planning appropriate multidisciplinary care. Odontogenic infection can potentially become a focus for life threatening sepsis in a child with severe myelosuppression during chemotherapy or following a bone marrow transplant[6-8]. Central venous lines used for the administration of chemotherapeutic agents are particularly prone to secondary infection from bacteraemia sourced from the oral cavity[1]. Occasionally, even mobile exfoliating primary teeth have been reported to cause severe facial cellulitis and secondary airway complication in the immunocompromised child[7].

4. Case selection

All children diagnosed with cancer should be screened bedside by a paediatric dentist prior to commencement of chemotherapy. When oral disease is noted, a paediatric dental consultant should assess the child more thoroughly within the department of dentistry. A comprehensive dental examination should be undertaken with the aid of appropriate radiographs and other clinical investigations. When dental treatment is needed prior to or during chemotherapy, careful planning with the oncology team is essential[8, 9]. At the time of diagnosis and during the initial stages of chemotherapy, dental care should be provided by the paediatric dentist within the hospital. Elective dental treatment should be delayed until the child is either in remission or on maintenance chemotherapy. Children in full remission for two years can be treated by a general dentist for most routine care, although a FBC is prudent if an invasive procedure is planned. Pulpal therapy of primary teeth during the induction and intensification phase of chemotherapy is contraindicated[1]. When pulpal therapy of permanent teeth is needed, the risk of bacteraemia and potential septicaemia must be weighed against the potential benefits of tooth conservation.

5. Clinical steps

Although oncology children require continual medical evaluation of treatment and decisions, oral care can be divided into three phases in accordance with the child's medical status, cancer treatment and dental needs[10]. Each cancer treatment phase presents different oral problems and management strategies[1].

STAGE 1: PRE-ONCOLOGY THERAPY

Objectives: to manage acute dental pathology
to eliminate a potential focus for dental related sepsis
to investigate orofacial region for presence of malignancy[10]

CLINICAL EVALUATION to identify existing and potential sources of oral infection / sepsis to evaluate potential dental / oro-facial development anomalies	• head and neck exam • intraoral soft tissue exam • dental and periodontal status • oral hygiene (OH) assessment
RADIOGRAPHIC EVALUATION to evaluate dental and oro-facial development,	• panoramic film (mandatory for all patients) • periapical and bitewing films when clinically indicated

diagnose pulpal pathoses, dental caries	
TREATMENT PLAN to prevent, stabilise and eliminate oral infections and potential complications	• may require urgent care under GA on work in list with dental registrar • dental restorations (temporisation only, if appropriate) • extractions of pulpally involved teeth • extractions of exfoliating primary teeth • removal of orthodontic appliances and potential soft tissue irritants • dental scaling and prophylaxis • topical fluoride treatment
PATIENT EDUCATION to understand oral complications of disease and therapy, stress the importance of protocol compliance to minimise discomfort, to facilitate execution of dental treatment plan	Discuss with parent or care giver: • examination findings and treatment plan • possible oral side effects of the chemotherapy regimen and therapies • issue patient information brochure • potential long-term complications (disturbances to oro-facial growth and development)
GENERAL MANAGEMENT GUIDELINES see appendix	Routine dental care only if: • neutrophil count >1000 • platelet count > 75,000 • antibiotic prophylaxis if central venous line is present or neutrophil count <1000 • allow 10 days for post-surgical wound healing

ORAL HYGIENE INSTRUCTIONS

TOOTH BRUSHING	• regular soft brush (soften under hot water before use) • use 2-3 times daily • preferably with a paediatric fluoride toothpaste (400ppm) • brush teeth and tongue • end-tufted toothbrushes are recommended (Oral B) • contact department if patient does not have a suitable tooth brush
FLOSSING	• once daily if patient older than 12 years and is used to regular flossing and can manage it atraumatically • if not, it can be taught and emphasised following hospital discharge in the department
MOUTH RINSES	***Normal saline***: • general indications: recent tooth extraction sockets • swish/spit 4 times daily ***Sodium bicarbonate***: • general indications: if patient has xerostomia or thick saliva • swish/spit 4 times daily ***Aqueous chlorhexidine 0. 12% (rinse or gel)***: • general indications: poor/fair OH, gingivitis, mouth ulcers, mucositis • if children are prescribed chlorhexidine rinses, it should only be stopped if they can't tolerate it anymore (due to burning/stinging sensations) • swish/gargle for 30 secs 3 times daily, preferably after meals, NPO for 30 minutes afterwards • brown staining of teeth and tongue may occur (removable later by hygienist in dental department) • do not use it together with oral Nilstat or other topical meds; use these at least 30 minutes apart (their interaction decreases their clinical efficacy due to competition for anionic sites on the mucosa) ***Neutral sodium fluoride 0.05% (rinse or gel)***: • general indications: high dental caries risk patents, prolonged xerostomia associated with head and neck radiotherapy • frequency of use to be determined by caries risk assessment • rinse 5mls nightly for 30 seconds before bedtime • gel applied in custom trays (made from dental impressions) for 3 minutes before bedtime

NOTE: be aware of high sugar content of some paediatric oral meds. e.g., liquid Nilstat drops contain 50% - 60% sucrose

PATIENT / PARENT EDUCATION

to understand the oral complications during oncology treatment to increase compliance with oral care protocol in order to minimise discomfort and possible complications	• discussion of the possible oral complications of chemotherapy and radiotherapy • discussion of dental / oral exam findings and recommended treatment plan • issue the parent information brochure • discussion of the potential long-term effects of therapy on oro-facial and dental development
to facilitate execution of dental treatment plan and encourage long term follow-up	• obtain written informed consent for dental management • arrange urgent care under GA at RCH on work in list with paediatric dental registrar • if not possible, arrange appropriate care at a public community dental clinic (if eligible) or private general dentist • use the referral letter template and copy to oncologist and family GP

STAGE 2: DURING ONCOLOGY THERAPY

Objectives: to decrease the severity and prevalence of oral complications
to prevent the occurrence of opportunistic infections
to minimise adverse effects on the developing dentition
to reduce the prevalence and severity of mucositis[9-13]

ORAL HYGIENE

TOOTH BRUSHING	• regular soft brush and paediatric fluoride toothpaste (400 ppm) • soften brush with warm water prior to use • 2-3 times daily • use end-tufted tooth brushes • use foam tooth brushes (toothettes) if child cannot use a brush • if child cannot tolerate toothpaste, dip toothbrush in normal saline, sterile water or a sodium bicarbonate solution
FLOSSING	• once daily if patient is used to doing it • discontinue if mucositis is present • if patient is not used to it, do not emphasise it
MOUTH RINSES	• chlorhexidine 0.12% is the preferred prophylactic agent for mucositis[11] • discontinue if patient has burning / stinging sensations or soft tissue dryness • use sodium bicarbonate or normal saline as an alternative • swish for one minute then spit out 3x during the day • keep it cold (it soothes inflamed tissues) • rinse mouth with water after each emesis episode to clear gastric acid from mouth to avoid tissue irritation / tooth decalcification • hydrogen peroxide or alcohol based rinses are not recommended because they increases dryness, breakdown of newly formed tissues, disrupt the normal oral flora, there is increased risk of aspiration and foaming and are not well tolerated by children • there is a limit to removal of hardened debris and management of periodontal infections with mouth rinses

ORAL MUCOSITIS MANAGEMENT

PAIN	• systemic analgesics prescribed by oncologist
	• topical 2% viscous xylocaine
	  ○ do not gargle or swallow (keep gag reflex active)
	  ○ gently swish / bathe tissues for at least 30 seconds
	  ○ not to be used more than once every 3 hours
	• other measures to be considered
	• systemic analgesics
	• ice packs to throat and cheeks prn
	• ice blocks, popsicles, slushies
	• bedside suction to clear oral secretions
	• tissue debridement (for loose hyperkeratotic tissues only)

LIP CARE	• use lanolin-based products • avoid petroleum jelly, vaseline, mineral oil due to risk of aspiration, flammable, increase tissue dryness, can promote bacterial growth • angular cheilitis, apply Daktarin or Kenalog cream applied tid with cotton bud
ORAL INFECTIONS	• close monitoring of oral mucosa by dental consultant • oral cultures for all suspicious lesions • systemic meds are often needed for fungal and viral lesions in consultation with medical consultant
GINGIVAL OR MUCOSAL HAEMORRHAGE	• identify source, usually an exfoliating tooth or socket • apply WET gauze pressure packs • use topical haemostatic agents (Surgicel, Thrombin, Gelfoam, Tranexamic Acid) • systemic therapy (platelet transfusion as directed by medical consultant
FACIAL SWELLING	• common with oral mucositis and after radiotherapy • ice packs 4-6 times daily for 20 minutes

DENTAL TREATMENT

	• see appendix for general management guidelines • only emergency dental procedures should be undertaken • extraction therapy on a work in list with dental registrar • if neutrophil count <1000, appropriate antibiotic coverage is recommended • emergency relief of toothache or jaw pain with systemic analgesia directed by medical consultant • in the absence of obvious dental infection, oral pain is usually due to drug neurotoxicity (particularly vincristine)

STAGE 3: POST-ONCOLOGY THERAPY

ORAL HYGIENE

Objectives: to decrease the severity and prevalence of future oral diseases
to minimise adverse effects on the developing dentition and facial skeleton[12]

TOOTHBRUSHING	• tooth brushing 2-3 times daily • use a paediatric fluoride toothpaste (400ppm)
FLOSSING	• flossing once daily
MOUTH RINSES	***Neutral sodium fluoride 0.05% (rinse or gel)***: • general indications: high dental caries risk patents, prolonged xerostomia associated with head and neck radiotherapy • frequency of use to be determined by caries risk assessment • rinse 5mls nightly for 30 seconds before bedtime • gel applied in custom trays (made from dental impressions) for 3 minutes before bedtime

DENTAL RECALL

	• regular dental visits every 4-6 months (recall interval based on caries risk assessment) • xerostomic patients: every 3 months

LONG TERM EFFECTS

TASTE ALTERATION	• common with head / neck radiation • usually returns to normal after 2-4 months • nutrition counselling may help
XEROSTOMIA	• non alcohol based mouth rinses and oral hygiene • use a saliva substitute, methyl cellulose • frequent intake of liquids such as water • neutral 0.05% sodium fluoride application (rinses or gel) • frequency and delivery method to be determined by paediatric dental consultant
RADIATION CARIES	• concurrent with xerostomia • use multiple topical fluoride treatments (gel or rinse) in custom trays • frequent dental review (every 3 months)
MUSCULAR TRISMUS	• radiation damage to TMJ / masticatory muscles • limited jaw opening • physiotherapy and jaw exercises (Therabite)

ORO-DENTAL DEVELOPMENTAL DISTURBANCES children < 6 yrs: high risk children 6-12 yrs: medium risk children > 12yrs: low risk	• tooth agenesis • short or non-existent roots • small poorly shaped crowns • early closure (blunting) of roots • enamel hypoplasia / hypomineralisation • microdontia • loss of alveolar bone height • loss of vertical dimension of lower facial third
OSTEORADIONECROSIS rare in children	• compromised bone socket healing in previously irradiated bone • pack alveolar sockets with Gelfoam or Surgicel post extraction • antibiotic prophylaxis peri-operative may be helpful

APPENDIX

BLOOD COUNTS

TEST	NORMAL	
	MALE	FEMALE
Haemoglobin (g/dl)	13.5 – 17.5	12 - 15
Haematocrit (%)	40 – 52	36 – 48
Red blood cell count (x 10^6)	4.5 – 6.5	4 – 5.5

PLATELET DISORDERS

Disorders of platelets include increased platelets (thrombocytosis), decreased platelets (thrombocytopaenia) or dysfunctional platelets

Normal platelet count – 150,000 / mm^3 to 400,000 / mm^3

Thrombocytosis: is a rare disorder which may be caused by polycythaemia, neoplasms, infection, and a physiological response to exercise, pregnancy, or adrenaline release.

Thrombocytopaenia: is defined as a platelet count < 140,000 / mm^3. Patients with platelet counts <75,000 / mm^3 may exhibit post-surgical haemorrhage while counts <25,000 / mm^3 cause spontaneous haemorrhage, easy bruising and petechiae and ecchymosis of the skin / mucosa.

DISEASES OF THE WHITE BLOOD CELLS (WBC)

Diseases of the leucocytes are among the most important disorders for dentists to understand since early oral signs and symptoms are prominent in this disease and dental treatment is complicated by the increase risk of infection.

Different White Blood Cell Count Normal Values		
Cell Type	Absolute Number per mm^3	Percent
Band	0 –2,000	0 - 10
Neutrophil	3,000 – 6,000	30 - 75
Lymphocyte	1,500 – 4,000	20 - 50
Monocyte	200 – 900	1 – 12
Eosinophil	100 - 700	0 – 3
Basophil	20 - 150	0 - 1
Total WBC (leucocyte) count: 4,000 to 11,000 cells/mm^3		

Leucopoenia: is a decrease in the absolute number of white blood cells, which may be divided into disorders causing decreased neutrophils (neutropaenia) or decreased lymphocytes (lymphopaenia) or both.

Neutropaenia: is not a disease but a sign of an underlying disorder affecting the bone marrow or peripheral blood.

Neutropaenia	
Mild	1,000 / mm^3 – 2,000 / mm^3
Moderate	500 / mm^3– 1,000 / mm^3
Severe	<500 / mm^3

Patients with severe neutropaenia are highly susceptible to overwhelming bacterial infection, making dental treatment accompanied by bacteraemia a risky procedure

ABSOLUTE NEUTROPHIL COUNT (ANC)

ANC = WBC X (%segs + % bands)
segs: mature neutrophils (polymorphs or PMNs)
bands: immature neutrophils

MOUTHCARE FOR CHILDREN AND YOUNG PEOPLE WITH CANCER: EVIDENCE BASED GUIDELINES[13]

At a glance document, page 65.

(TRUST LOGO)

MOUTHCARE FOR CHILDREN AND YOUNG PEOPLE WITH CANCER: EVIDENCE BASED GUIDELINES.

DENTAL CARE / TREATMENT

Oral & dental assessment	• Ideally by a dentist or dental hygienist linked to the cancer centre. • Any treatment required should be undertaken by a consultant or specialist paediatric dentist. • If there is not a paediatric dental unit liaising with the cancer centre there should be clear communication between the cancer centre and the routine dental provider.
Dental assessment every 3 – 4 months	• Ideally by a dentist linked to the cancer centre (retain registration and communication with usual dental provider). • Any treatment required should be undertaken ideally by dentist linked to the cancer centre. • If not available, then by usual dental provider with clear communication & guidance from the cancer centre.
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BASIC ORAL CARE

	• Brush teeth well twice a day using fluoride toothpaste and soft toothbrush. • Whilst in-patient, oral assessment using OAG and score recorded. Frequency of assessment determined by individual need. • **OAG score >8 means increased risk of oral complications.** • Use of additional aids e.g. floss, fluoride tablets and electric toothbrushes – by recommendation of dental team only. Chlorhexidine is not recommended unless – see below. (If unable to brush teeth, clean mouth with oral sponges moistened with water or diluted chlorhexidine)

ORAL COMPLICATIONS

	PREVENTION	TREATMENT
	• Basic oral care (as above).	• Basic oral care (as above). • Appropriate pain control.
	• Basic oral care. *Clinical decision required. If antifungal agent to be used, choose one absorbed from GI tract e.g. fluconazole, itraconazole or ketoconazole.* • Check treatment protocols. • Nystatin is not recommended.	• Basic oral care, plus *Clinical decision required about which antifungal agent to use, choose one that is absorbed from the GI tract eg fluconazole, itraconazole or ketoconazole.* • Check treatment protocols. • Nystatin is not recommended.
	• Basic oral care	• Basic oral care. • Consider saliva stimulants/artificial saliva.
	• Basic oral care • Aciclovir is only recommended as a preventative strategy for herpes simplex in patients undergoing high dose chemotherapy with stem cell transplant / BMT	• Basic oral care, plus Mild and/or non progressive lip lesions: topical aciclovir. Moderate/severe and/or progressive lip lesions & for Mild/Moderate oral lesions: oral aciclovir. Severe oral lesions or if oral cannot be tolerated: IV aciclovir. (*for doses see BNF – Children*)

ukccsg Royal College of Nursing CLIC Sargent Caring for Children with Cancer

SC/EA / Sept 2005
Review Date Sept 2006

REFERENCES

[1] Dentistry AAoP. Guideline on dental management of pediatric patients receiving chemotherapy, hematopoietic cell transplantation, and/or radiation. Pediatr Dent. 2008;30(7 Suppl):219-25.

[2] Institute NC. Cancer Information. 2010 [cited 5 October 2010]; Available from: http://www.cancer.gov/cancertopics/youngpeople/page7#G7

[3] Group CsCaL. Brush up on the best type of mouth care. 2010 [cited 8 October 2010]; Available from: http://www.cclg.org.uk/contact/article.php?art=272&2id=10&issue=35

[4] McWhirter WR, Dobson C, Ring I. Childhood cancer incidence in Australia, 1982-1991. Int J Cancer. 1996 Jan 3;65(1):34-8.

[5] Baade PD, Youlden DR, Valery PC, Hassall T, Ward L, Green AC, et al. Trends in incidence of childhood cancer in Australia, 1983-2006. Br J Cancer. 2010 Feb 2;102(3):620-6.

[6] Smith MA, Ries LAG. Childhood cancer; incidence, survival, and mortality. In: Pizzo PA, Poplack DG, eds. *Principles and Practice of Pediatric Oncology*. 4th ed. Philadelphia: Lippincott Williams & Wilkins 2002:1-12.

[7] Marques AP, Walker PO. Intraoral etiology of a life-threatening infection in an immunocompromised patient: report of case. ASDC J Dent Child. 1991 Nov-Dec;58(6):492-5.

[8] Hong CH, da Fonseca M. Considerations in the pediatric population with cancer. Dent Clin North Am. 2008 Jan;52(1):155-81, ix.

[9] da Fonseca MA. Dental care of the pediatric cancer patient. Pediatr Dent. 2004 Jan-Feb;26(1):53-7.

[10] Barberia E, Hernandez C, Miralles V, and Maroto M. Paediatric patients receiving oncology therapy: review of the literature and oral management guidelines. Eur J Paediatr Dent. 2008 Dec;9(4):188-94.

[11] Ferretti GA, Raybould TP, Brown AT, Macdonald JS, Greenwood M, Maruyama Y, et al. Chlorhexidine prophylaxis for chemotherapy- and radiotherapy-induced stomatitis: a randomized double-blind trial. Oral Surg Oral Med Oral Pathol. 1990 Mar;69(3):331-8.

[12] Ried H, Zietz H, Jaffe N. Late effects of cancer treatment in children. Pediatr Dent. 1995 Jul-Aug;17(4):273-84.

[13] Group U-PMC. Mouth Care for Children and Young People with Cancer: Evidence-based Guidelines. 2006 [cited 19 October 2010]; Version 1:[Available from: http://www.rcn.org.uk/__data/assets/pdf_file/0017/11276/mouth_care_cyp_cancer_guideline.pdf