Abstract of thesis entitled

“A Community-based Programme in Oral-health Education Targeted at Pre-school Children and Their Caregivers in Hong Kong”

Submitted by

Yeung Man Wai

for the degree of Master of Nursing

at the University of Hong Kong

July 2012

Early childhood caries is a condition of rapidly progressing rampant dental caries in infants and young children. It is considered as a major public health problem affecting pre-school children and it is the most common dental disease which affects 28% of children within two to five years of age. ECC not only induces pain and discomfort, but can also affect communication, nutrition status, learning abilities, speech and quality of life, which may progress into adulthood and pose a heavy burden on the healthcare system in long-term. In Hong Kong, over 50% of children were affected by dental caries in 2001 but over 70% of children had never been to a dentist for a regular check up at age five. Thus, much of the tooth decay was remained undetected and untreated.

Dental caries can be preventable and achievable. Collaboration between families, early care and health care professionals is required to promote effective oral health care. Numerous studies have found that educational programs and workshops are effective in promoting oral
health and can provide children a lifelong opportunity to be free from preventable oral disease. In order to promote oral health to achieve the mission of the Department of Health in Hong Kong- at least 65% of 5 years old children are free from caries by the year 2020, an evidence-based guideline for a community-based programme in oral health education was developed in the proposed setting after a critical appraisal of the reviewed evidence. The comprehensive intervention plan, including communication plan with stakeholders, training of staffs and pilot testing will be carried out to facilitate the implementation of the innovation. The oral health programme will be evaluated for its effectiveness in achieving the patient outcomes, health providers’ outcomes and system outcomes in the proposed settings.
A Community-based Programme in Oral-health Education Targeted at Pre-school

Children and Their Caregivers in Hong Kong

by

YEUNG MAN WAI

BN (Hons) HKPU

MBA Heriott Watt Unviersity

PgD in Epidemiology & Biostatistics CUHK

A thesis submitted in partial fulfillment of the requirement for

the degree of Master of Nursing

at the University of Hong Kong

July 2012
Declaration

I declare that this thesis represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

Signed_________________________________

Yeung Man Wai
Acknowledgments

I would like to take the opportunity here to thank the Public Health Nursing Division and the Department of Health for offering me the sponsorship and support to study in the Master of Nursing Programme (Public Health Stream) at the University of Hong Kong. Also, I would like to thank for my supervisors and all of my colleagues that share my workloads and their invaluable support during the time of study.

Also, I would like to express my deepest appreciation and express my sincere gratitude to Dr. Marie A Tarrant as my Academic Supervisor, for her tireless effort, timely encouragement, guidance and enthusiastic support in preparing the dissertation and innovative thinking. I would like to express my respect and thanks to Dr. Agnes FY Tiwari and Dr. Daniel Fong for enriching my knowledge of translational research.

Last but not least, I would like to thank for my family and friends for their invaluable support to overcome the frustrations in completing the Master of Nursing programme.
# Contents

Declaration ......................................................................................... i
Acknowledgements ........................................................................ ii
Table of Contents .......................................................................... iii
List of Tables ................................................................................ v

## Chapter 1: Statement of the Problem

- Introduction ........................................................................................ 1
- Background ....................................................................................... 2
- Significance of the Problem .............................................................. 7

## Chapter 2: Review of Evidence

- Objectives ......................................................................................... 8
- Study Selection Criteria ................................................................. 9
- Data Extraction .............................................................................. 14
- Description of Studies ................................................................... 19
- Quality Assessment ....................................................................... 21
- Data Summary and Synthesis ....................................................... 26

## Chapter 3: Implementation Potential

- Target Audience and Setting ....................................................... 31
- Transferability of the Findings ...................................................... 32
- Feasibility ....................................................................................... 37
- Cost-Benefit Ratio ......................................................................... 40
## Chapter 4: Evidence-Based Guidelines

- Overview of the Guidelines ................................................................. 43
- Intervention Guidelines and Protocols ............................................. 44

## Chapter 5: Implementation Plan

- Communication Plan ............................................................... 50
- Pilot Testing ........................................................................... 54

## Chapter 6: Evaluation Plan

- Intervention Outcomes ............................................................. 58
- Clients to be involved ............................................................. 59
- Recruitment Plan .................................................................. 60
- Data Analysis .......................................................................... 61
- Criteria for Effectiveness ....................................................... 62

References .................................................................................. 65

Appendix A: SIGN 50 Methodology Checklist 2: Randomized Controlled Trials ........... 71
Appendix B: Levels of Evidence and Grades of Recommendations ....................... 76
Appendix C: Dental Health Survey ................................................................ 77
Appendix D: Training Evaluation for Health Professionals .................................. 81
List of Tables

Table 1
Search Strategy and Results.................................................................11

Table 2
Table of Evidence.............................................................................13

Table 3
Study Extraction Flow Chart.........................................................15

Table 4
Gantt Chart- Innovation Planning Timeline....................................36
Chapter 1: Statement of the Problem

Introduction

Oral Health is recognized as an important factor to overall general health. Good oral health maintenance has the potential to improve health and well-being. Oral diseases, however, are prevalent conditions (Abanto et al., 2011; Plutzer & Spencer, 2008). Dental Caries is the most common chronic infectious transmissible dental disease in children resulting from the overgrowth of tooth-adherent specific bacteria, mainly by Mutans Streptococci (MS) and Lactobacillus species. They ferment the dietary sugars into acid and dissolve the enamel or dentine over a period of time (American Academy of Pediatric Dentistry, 2009). Thus, by the age of six months, the child is susceptible to teeth decay when the first baby tooth appears (Ramos-Gomez, Crystal, Ng, Tinanoff & Featherstone, 2010).

Early childhood caries (ECC) is a condition of rapidly progressing rampant dental caries in infants and young children (Mohebbi, Virtanen, Vahid-Golpayegani & Vehkalahti, 2009). It indicates the presence of one or more decayed, missing, or filled tooth surfaces (DMFS) in any primary tooth under the age of six (American Academy of Pediatric Dentistry, 2009). Major risk factors for ECC include improper feeding habits, socio-economical factors, nutritional status, complicated pregnancies, ethnicity, low birth weights and traumatic births (Arora, et al., 2011; Bayarak, Okte & Fidancı,
2011; Begzati, Berisha & Mega, 2010; Li et al., 2011; Grant, Kotch, Quinonez, Kerr & Roberts, 2010).

Even if the initial caries is asymptomatic, the severe caries in the primary dentition may potentially affect the permanent successor development. ECC can also affect both children’s general health and development significantly (D’Mello, Chia, Hamilton, Thomson & Drummon, 2011; Yen, Huang & Hu, 2010). Consequences of ECC include physical symptoms such as pain and discomfort, impaired speech and communication, risks for delayed growth and development, increased future dental caries, learning difficulties and diminished oral-health related quality of life (Abanto et al., 2011; Plutzer et al., 2008; Ramos-Gomez et al., 2010)

Dental caries remain a major public health concern in both developing and developed countries. In United States (U.S), a well-developed country, there are still approximately 1,800,000 children under the age of 6 experienced ECC and this imposes a heavy burden on the U.S. health care system (Macek, Heller, Selwitz & Manz, 2004).

**Background**

**Dental Health Survey Statistics 2001 in Hong Kong**

In Hong Kong, since the introduction of fluoridation of domestic water supply in 1961, the percentage of children with dental caries had declined from 98% in 1960 to
51% in 2001 and the mean number of DMFS had dropped from 9 in 1960 to 2.3 in 2001 (Department of Health, 2001).

Although dental caries in preschool children has declined in the past decades, it is still problematic. Over 50% of children were affected by dental caries and 23.6% of children even had four or more teeth with decay experience. However, 91.3% of the decayed teeth were left untreated and about 5.7% of children had dental abscess and these are probably associated with extensively decayed teeth. With regards to cleanliness of the children’s teeth, only 2.4% of children had no visible dental plaque on their teeth and most were found to have some dental plaque on their teeth (Department of Health, 2001). An increased thickness of plaque increases the acid production and thus reduces the buffering effect of the saliva and causes tooth decay (Harris, Nicoll, Adair & Pine, 2004; Meurman & Pienihakkinen, 2010).

Besides, the improper use of nursing bottles such as sleeping with the bottle at night, using the bottle as a pacifier and prolonged use of bottle was found to be associated with dental caries (Douglass, J.M., Douglass, A.B. & Silk, 2004; Narksawat, Boonthum & Tonmukayakul, 2011). Locally in Hong Kong, a recent survey showed that prolonged use of formula milk in nursing bottles was common over the age of three and over 50% of the children were given a bottle before bed. Of these children, 63.7% fell asleep with the nursing bottle (Department of Health, 2001).
Loss of minerals from tooth resulted from the sustained acidogenicity during the low saliva production at sleep (Harris et al., 2004; Ramos-Gomez et al., 2010).

Several studies revealed that toothbrushing frequency and the parental involvement could reduce the risk of dental caries (Douglass et al., 2004; Harris et al., 2004; Martignon et al., 2006; Vanagas, Milasauskiene, Grabuskas & Mickeviciene, 2009). Brushing at least twice a day with fluoride toothpaste under supervision is the most common form of caries control (Chambrone, L.A. & Chambrone, L., 2011; Plutzer, et al., 2008). However, almost 10% of the 5 years old children did not brush their teeth on a daily basis and only 16.5% of the children had parental assistance during toothbrushing in Hong Kong (Department of Health, 2001).

Promoting parent education would be an effective method to improve children’s dental care (Grant, et al., 2010; Narksawat et al., 2011). In assessing the parental oral health knowledge, a study found that 43.5% of parents had misconceptions towards tooth decay was due to lack of calcium in the teeth and also believed that calcium supplement could prevent tooth decay in advance. In addition, most parents did not know the frequent food and drink intake could increase the dental risks besides candies and sweet food consumption (Department of Health, 2001).

At the time of eruption of the first tooth, an oral examination is recommended and should not be later than 12 months. Early detection and management of oral
conditions play an important role in improving children’s oral health (American Academy of Pediatric Dentistry, 2009). Parents in Hong Kong reported that regular dental check up is important in preventing tooth decay and gum diseases. However, there were 72.2% of children had never been to a dentist for regular check up at age of 5 (Department of Health, 2001). Much of the tooth decay, was thus remained undetected and untreated, may lead to more serious health problems.

Social Significance

In social aspects, since the consequences of ECC not only include pain and discomfort, it can also affect communication, nutrition status, learning abilities, speech and quality of life, which may progress into adulthood and pose a heavy burden on the healthcare system in long-term (Abanto et al., 2011; Begzati et al., 2010). Additionally, ECC may require hospitalization, emergency room visits and even invasive treatment. These would encounter restorative and costly treatment under general anesthesia in operating rooms. According to the American Academy of Pediatric Dentistry in 2009, such operations cost from $1500-$2000 US dollars per child per year under Medicaid expenditures.

Dental Services for Preschool Children in Hong Kong

Promotional service

The Oral Health Education Unit (OHEU) of the Department of Health provides
educational oral health services to pre-primary children. “Brighter Smiles Playland Visitation Program” and “Brighter Smiles for the New Generation Oral Health Promotion Program” are the two major promotional services.

**a. Brighter smiles playland visitation program**

This program is targeted at the 4 year-old children and it is led by a Dental Therapist in a one hour learning activity focusing on the three major themes on toothbrushing, dental visit and tooth-friendly diet (Oral Health Education Unit, 2011).

**b. Brighter smiles for the new generation oral health promotion program**

This program is targeted at children under 6 year-old studying in kindergartens. The school will be given education resources include VCDs, storybooks and student handbooks provided by OHEU to design a 12 week program to implement a toothbrushing and toothfriendly diet activities a home. Teachers are provided with the educational materials to share oral health messages and the instructions on the programme details (Oral Health Education Unit, 2011).

The above programs are not compulsory and require active participations by schools’ applications targeted at children aged above 4 year-old.

**Curative Service**

No curative service is provided to preschool children unless a child is a dependent of the civil servant. Preschool children can only seek dental service from
private sectors. The government in Hong Kong only provides a preventive service at the School Dental Cares Service to primary school’s children (Oral Health Education Unit, 2011).

**Significance of the Problem**

According to World Health Organization (1986), “oral health promotion is any planned effort to build healthy public policies, create supportive environments, strengthen community action, develop personal skills or reorient health services in the pursuit of oral health goals” (p. 1). Dental caries can be preventable and achievable. The prevention of dental caries is considered as more cost-effective than its treatment (Martignon, et al., 2006). Oral health is an important part of primary care and is a good indicator of overall health of an individual. Educational programs and workshops are found effective in promoting oral health and preventing early childhood caries (Feldens, Giugliani, Duncan, Drachler & Vitolo, 2010; Grant et al., 2010; Harris et al., 2004; Martignon et al., 2006; Mohebbi et al., 2009). Although there are “Brighter Smiles Playland Visitation Program” and “Brighter Smiles for the New Generation Oral Health Promotion Program” organized by OHEU of the Department of Health, they only targets on children who are at 4 year-old or above and are lasted for a short period of time only. Furthermore, the Oral Health Education Unit only provides limited resources such as e-information, leaflets and storybooks.
that are insufficient to provide anticipatory guidance for parents and caretakers.

Lifetime habits are established in early childhood and it is a “golden” opportunity to provide socialization for good health (Harris, et al., 2004). Initiating the oral health education for parents or caretakers during subsequent child health visits with primary health workers thus served as a foundation to a lifetime preventive education to ensure optimal oral health (Narksawat et al., 2011). Given the pathophysiology in dental caries and the mission of the Department of Health which targets on achieving at least 65% of 5 year-old children are free from caries by the year 2020 in Hong Kong, a community based educational program should be implemented as an important oral health promotion and dental caries preventive strategy.

Chapter 2: Review of Evidence

Objectives

The objectives of the review in this proposed study are as follow:

1. To determine the most effective educational and promotional strategies in a community-based oral health programme.

2. To determine the effectiveness of a community-based oral health programme on the oral health promotion and prevention of ECC.

Research Question

A community-based programme in oral-health education targeted at pre-school
children and their caregivers in Hong Kong.

**PICO Components**

“PICO” format (patient population, intervention of interest, comparison intervention, and outcome) is adopted to have the best and most relevant evidence in the clinical question (Melnyk & Fineout-Overholt in Melnyk & Fineout-Overholt, 2008, p.8). The answerable and searchable clinical question is formulated as: “A community-based oral health programme (the intervention) in comparison to the current practices (the comparison intervention) for pre-school children and their caregivers in Hong Kong (the patient population) in promoting oral health care (the outcome)”.

**Study Selection Criteria**

**Keywords**

The following keywords were used in the literature search: dental caries, child, preschool, preschool children, education, and dental education. The number of studies yielded by each keyword is listed in Table 1.

**Inclusion Criteria**

**Types of studies.** All randomized controlled trials which include oral health educational and promotional intervention compared with those with no educational or
promotional intervention.

**Types of participants.** The intervention group of children and their caregivers received oral health education. The control group of children and their caregivers received no oral health education.

**Types of intervention.** The intervention included any kinds of educational oral health information.

**Types of outcome measure.** Outcomes included mean caries increment, prevalence of ECC, bacterial plaque index and increased oral health knowledge and practices.

**Exclusion Criteria**

Studies were excluded for the following reasons: (1) included children were born preterm or had specific health problems; (2) focused on training of dental assistants; (3) focused on pre-operative education; (3) conducted in a non-fluoridated area; (4) focused mainly on fluoride varnish treatment or fluoride foam; (5) focused on the applications of electric toothbrush and cross brushing technique; (6) involved xylitol chewing gum as intervention; (7) involved cancer treatment; (8) involved dental screenings and referrals.
Table 1: Search Strategy and Results

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dental caries. m.p. or Dental Caries</td>
<td>35569</td>
<td>206</td>
<td>40334</td>
<td>2054</td>
</tr>
<tr>
<td>2</td>
<td>Child, Preschool or preschool children, m.p.</td>
<td>682325</td>
<td>NA</td>
<td>671277</td>
<td>705</td>
</tr>
<tr>
<td>3</td>
<td>Education or dental education or education.m.p.</td>
<td>5611</td>
<td>1917</td>
<td>795428</td>
<td>41</td>
</tr>
<tr>
<td>4</td>
<td>Combine (1)(2)(3)</td>
<td>390</td>
<td>NA</td>
<td>967</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Limit to Preschool Children</td>
<td>NA</td>
<td>10</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>6</td>
<td>Limit to randomized Controlled Trial</td>
<td>24</td>
<td>NA</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Total</td>
<td></td>
<td>66 journals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Eliminating duplicates</td>
<td></td>
<td>26 journals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>(7)-(8)</td>
<td></td>
<td>40 journals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Search Strategies**

A comprehensive literature search was performed in week 2 August 2011 in four databases via the OvidSP search engine to identify all relevant studies irrespective of language:

1. Ovid MEDLINE (R) (1996 to August week 2 2011)
2. Cumulative Index to Nursing & Allied Health Literature (CINAHL) (1996 to August week 2 2011)
4. EBM Reviews- CDSR, ACP Journal Club, DARE, CCTR, CMR, HTA, NHS Econ Eval

Sixty-six articles were identified from the databases. Of which twenty six articles were duplicates and were thus eliminated. Forty studies were finally identified and examined with reference to the inclusion and exclusion criteria listed previously. Thirty-three studies were excluded after the review of the abstracts. In the end, seven RCTs studies were included for the final study (Table 2).
Table 2: Study Extraction Flow Chart

66 relevant studies from search engines

40 studies evaluated from search engines

7 studies remain for evaluation

Total 33 studies excluded for following reasons:
1. Training of dental assistants 1
2. Operation education 1
3. Located in non-fluoridated remote area 9
4. Focus on fluoride varnish treatment 4
5. Focus on fluoride foam 1
6. Cross brushing technique and electric toothbrush application 1
7. Xylitol Chewing gum during pregnancy 4
8. Surveys 4
9. Cancer treatment 3
10. Dental screenings and
Data Extraction

Three categories of variables are extracted from each study:

1. Participant variables (age, caries severity at baseline, study year and study settings)
2. Intervention variables (intervention types, duration of study, frequency and duration of intervention)
3. Outcome variables (mean caries increment, dental plaque index, oral health knowledge and practices)

Additional information related to quality assessment or study methodology was also included.

Quality Assessment

Quality assessment was performed with reference to the methodology checklist for RCTs from the Scottish Intercollegiate Guidelines Network (SIGN) (2008) (Appendix A) and the extracted studies was organized in the table of evidences (Table 3).
<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study design</th>
<th>Interventions</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plutzer et al., 2008</td>
<td>Randomized, examiner-blinded clinical trial</td>
<td>Three rounds of mailed-printed information and a structured telephone</td>
<td>No mailed-printed information and structured telephone consultation</td>
</tr>
<tr>
<td>2. Sgan-Cohen, et al., 2001</td>
<td>Quasi-experimental design</td>
<td>Education with toothpaste and tooth brushes (P1)</td>
<td>provided (C)</td>
</tr>
<tr>
<td>3. Feldens, et al., 2010</td>
<td>Parallel Randomized Controlled Trial</td>
<td>Nutritional Advice administered through home visits and pamphlets (I)</td>
<td>No organized educational intervention with toothpaste and toothbrushes</td>
</tr>
<tr>
<td>4. Mohebbi, et al., 2009</td>
<td>Cluster Randomized Trial</td>
<td>1. Oral Health instructions and extra reminder phone calls (P1)</td>
<td>provided (C)</td>
</tr>
<tr>
<td>5. Rong, et al., 2003</td>
<td>Randomized, examiner-blinded clinical trial</td>
<td>2. Oral Health instructions with pamphlet (P2)</td>
<td>No organized educational intervention without toothpaste and toothbrushes</td>
</tr>
<tr>
<td>6. Martignon, et al., 2006</td>
<td>Randomized Controlled Trial</td>
<td>Regular oral health education session to parents and their children and the</td>
<td>provided (C)</td>
</tr>
<tr>
<td>7. Slade et al., 2011</td>
<td>Randomized Controlled Trial</td>
<td>supervised tooth brushing activities (I)</td>
<td>No dental health program (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40 minutes Oral Health Workshop with leaflets and slide presentation (I)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Introduction of dental health program (I)</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------</td>
<td>------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Interventions</td>
<td>during pregnancy</td>
<td>nutrition</td>
<td>b. Refrain from</td>
</tr>
<tr>
<td></td>
<td>b. Importance of</td>
<td></td>
<td>sleeping with bottles</td>
</tr>
<tr>
<td></td>
<td>primary teeth</td>
<td></td>
<td>c. Refrain from</td>
</tr>
<tr>
<td></td>
<td>c. The use of pacifiers</td>
<td></td>
<td>using bottle as</td>
</tr>
<tr>
<td></td>
<td>and sleeping patterns</td>
<td></td>
<td>pacifiers</td>
</tr>
<tr>
<td></td>
<td>of the child</td>
<td></td>
<td>c. Refrain addition of</td>
</tr>
<tr>
<td></td>
<td>d. Eruption of teeth</td>
<td></td>
<td>sugars</td>
</tr>
<tr>
<td></td>
<td>e. Oral hygiene and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>nutrition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of Follow up</td>
<td>2 years</td>
<td>6 months</td>
<td>4 years</td>
</tr>
<tr>
<td>Outcome measures</td>
<td>Cumulative incidence</td>
<td>Percentage increase of</td>
<td>Primary outcome:</td>
</tr>
<tr>
<td></td>
<td>of severe early</td>
<td>Tooth brushing of Infants</td>
<td>Early childhood caries</td>
</tr>
<tr>
<td></td>
<td>childhood caries</td>
<td></td>
<td>(ECC), Secondary</td>
</tr>
<tr>
<td></td>
<td>(S-ECC) on maxillary</td>
<td></td>
<td>outcome: Severe</td>
</tr>
<tr>
<td></td>
<td>incisors</td>
<td></td>
<td>Early childhood caries</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(S-ECC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bibliographic citation</td>
<td>Effect size</td>
<td>Subjects</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>1. Plutzer et al., 2008</td>
<td>Incidence of S-ECC:</td>
<td>649 pregnant women and their children, I: 327, C 322</td>
<td></td>
</tr>
<tr>
<td>3. Feldens, et al., 2010</td>
<td>P2: 43.7%</td>
<td>C1: 133</td>
<td>C2: 139</td>
</tr>
<tr>
<td>4. Mohebbi, et al., 2009</td>
<td>C1: 45.1%</td>
<td>340 mothers and their children, I: 141</td>
<td></td>
</tr>
<tr>
<td>5. Rong, et al., 2003</td>
<td>C2: 32.5% p &lt;0.002</td>
<td>C: 199</td>
<td></td>
</tr>
<tr>
<td>7. Slade et al., 2011</td>
<td>P1: 0%</td>
<td>731 children and their parents;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P2: 14%,</td>
<td>I: 361</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C: 26%</td>
<td>C: 370</td>
<td></td>
</tr>
<tr>
<td></td>
<td>p value &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>770 pairs of children and their parents, I: 385, C: 385</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 caregivers in day care centre, I: 36, C: 24</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>543 children I: 281, C: 262</td>
<td></td>
</tr>
</tbody>
</table>

**Effect size**

Incidence of S-ECC:

- **I**: 1.7%
- **C**: 9.6%
- **p**< 0.05

Secondary outcome (S-ECC):

- **I**: 29.1%, **C**: 42.7% **p** < 0.010

**Primary outcome (ECC):**

- **I**: 53.9%, **C**: 69.3% **p** value < 0.004
- **P1**: 0%
- **P2**: 14%
- **C**: 26% **p** value < 0.001

**Secondary outcome**

1. **I**: 2.47 dmfs, **C**: 3.56 dmfs **p** value = 0.009
2. Increased oral health habits in brushing teeth in the test group with **p**<0.001
3. Parents had better knowledge in the test group with **p** value = 0.001.
4. Improved oral health attitudes of the parents in the test group with **p** < 0.005

**Lower net caries increment of average**

- 3.0 surfaces per child **p**<0.05
<table>
<thead>
<tr>
<th>Bibliographic Citation</th>
<th>Subject Characteristics</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plutzer et al., 2008</td>
<td>Nulliparous women at teaching (public) hospital in Adelaide, Australia</td>
<td>1-</td>
</tr>
<tr>
<td>2. Sgan-Cohen, et al., 2001</td>
<td>Parents and their infants aged 6-12 months among mother and health centers in Jerusalem</td>
<td>1+</td>
</tr>
<tr>
<td>3. Feldens, et al., 2010</td>
<td>Full-term babies with birth weight ≥2500 g in Brazil</td>
<td>1++</td>
</tr>
<tr>
<td>4. Mohebbi, et al., 2009</td>
<td>12-15 month-old children and their mothers from 18 public health centers in Tehran, Iran</td>
<td>1++</td>
</tr>
<tr>
<td>5. Rong, et al., 2003</td>
<td>Community-based: kindergartens in China</td>
<td>1++</td>
</tr>
<tr>
<td>6. Martignon, et al., 2006</td>
<td>Community-based: day care centre in Bogota, Colombia</td>
<td>1+</td>
</tr>
<tr>
<td>7. Slade et al., 2011</td>
<td>Community-based: Australia Aboriginal children</td>
<td>1++</td>
</tr>
</tbody>
</table>
Description of Studies

General Characteristics

The seven randomized controlled trials were overseas studies and conducted from diverse populations: Australia, Iran, China, Israel, Brazil and Colombia. The year of publication ranged from 2001-2011. The seven studies covered 4121 caregivers-child pairs and the sample size of studies ranged from 177-770 pairs. The follow-up period ranged from six months to four years in these studies and carried out in fluoridated community-based settings. The baseline data in DMFS were obtained among all seven studies to assess the oral health status of subjects. All studies involved multidisciplinary health staffs- dentist, medical doctors, nurses, teachers and health workers. Children with any severe diseases or in complicated pregnancy were excluded in all studies as that might pose a barrier in oral health practices. Three of the seven studies focused on participants who were from low socio-economic status (Martignon et al., 2006; Mohebbi et al., 2009; Slade et al., 2011).

Types of Intervention Components

All studies are educational intervention. The implementation of intervention started as early as 5-7 months of pregnancy to 5 year-old children and their caregivers. The majority of the intervention involved both children and their caregivers during health education sessions (Feldens et al., 2010; Martignon et al., 2006; Mohebbi et al.,
One of the seven studies solely involved participation of children during education sessions with toothbrushing under supervision (Rong, Bian, Wang, W.J. & Wang J.D., 2003). To ensure the consistency of oral health information, two studies provided oral health educational sessions with leaflets by healthcare staffs in public health centres with additional reminder phone calls or consultations (Mohebbi et al., 2009; Plutzer et al., 2008). To enhance knowledge and clarify any misconceptions, structured health educations and leaflets with toothbrushing activities or workshops for their caregivers were included in two other studies (Martignon et al., 2006; Sgan-Cohen et al., 2001). Posters, banners and brochures were also used as a media promoting oral health information at community-based settings (Sgan-Cohen et al., 2001; Slade et al., 2011). One of the included studies provided free 0.25ml Duraphat fluoride varnish on dental caries with an organized community oral health promotion program (Slade et al., 2011). Another study consisted of nutritional advice based on the “Ten Steps to Healthy Feeding” administered through home visits by trained undergraduate nutrition students (Feldens, Giugliani, Duncan, Drachler & Vitolo, 2010).

**Results of Outcome Measures**

**Effects of intervention**

Five of the seven studies found a significant positive relationship to decrease
mean caries increments, lower prevalence of ECC or severe early childhood caries (S-ECC) and lower median plaque score with oral health education interventions regardless of the socioeconomic variables (Feldens, et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Rong et al., 2003; Slade et al., 2011).

In addition, a significantly higher percentage of the subjects had practiced toothbrushing in the intervention group compared with the controls (Sgan-Cohen et al., 2001). Three studies found a positive effect on the enhancement of oral health knowledge, attitudes and habits with effective interventions (Martignon et al., 2006; Rong et al., 2003; Sgan-Cohen et al., 2001).

Quality Assessment

The Scottish Intercollegiate Guidelines Network (2008) is adapted as a framework for quality assessment. The internal validity of studies was evaluated based on the ten aspects of their design: (1) randomization; (2) adequate concealment; (3) blinding; (4) appropriate and focused question; (5) subjects with similar backgrounds; (6) treatment effects; (7) standard outcome measurement; (8) drop-out rates; (9) intention to treat analysis; (10) applicability. The details of level of evidence and grades of recommendations are summarized in Appendix B.

Among the seven studies, four RCTs were rated as level I evidence with high quality and a very low risk of bias (1++) (Feldens, et al., 2010; Mohebbi et al., 2009;
Rong et al., 2003; Slade et al., 2011). Two RCTs were rated as (1+) with low risk of bias (Martignon et al., 2006; Sgan-Cohen et al., 2001). Another RCT study with median risk of bias with high quality was rated as (1-)(Plutzer et al, 2008).

**Randomization and Blinding**

Randomization is used to assess the effectiveness of an intervention in achieving the outcome and blinding assessment is essential for minimizing bias from a subjective assessment of outcome measures. Effective strategy of randomization and blinding are paramount for assessing the quality of an RCT (Polit & Beck, 2008).

Placebo for intervention is not applicable in all seven studies.

To ensure adequate allocation concealment, the randomization, in Feldens et al.’s study (2010), was conducted by a researcher who was not involved in the research. Participants were in a list regards on their respective delivery time sequentially into a list in blocks of five and allocated to the treatment group or control group. The nutrition students who carried out the implementation were under standardized training. Face-to-face structured home interviews were conducted by the nutrition students who were not involved in the intervention and were blinded to group allocation. Dental examinations, were performed by the same blinded dentist who had the first year follow up.

In Martignon et al.’s study (2006), detailed randomization procedures was not
discussed. The baseline questionnaire was modified by five oral health experts and a pilot study was conducted for validity and understandable. The workshop and activities was carried out by a trained facilitator to ensure the consistency of information delivered. The intended outcome in the plaque examination was conducted by a trained blind examiner by using Silness & Loe modified Index to calculate the plaque index on the four surfaces of buccal, lingual, mesial and distal teeth with significant results.

In Mohebbi et al.’s study (2009), 18 of 102 public health centres were randomly selected with around 10-15 children per centre. An uninvolved dentist was responsible for supervising the randomization and intervention processes with a table of random numbers. Dental examination was carried out by the blinded dentist with standardized procedure for caries diagnoses according to WHO recommendations and was conducted on the same day as the children had their routine vaccination in the health centres. The room for dental examination was performed separately from vaccination room. The examining dentist was trained by a head pediatric dentist of a university department of pediatrics to ensure intra-examiner reliability. This study had a high level of blinding with high quality and a very low risk of bias.

In Plutzer et al.’s study (2008), although a random table was used to assign subjects into test group or control group, subjects could choose to refuse or accept for
the group allocation. This induced a potential loss of statistical power due to the lack of blinding. There were insufficient information sources on the anticipatory guidance on the three rounds printed information provided to the mothers. Only supplementary nutritional recommendations sources were provided—“Feeding Babies and Young Children” and “National Health and Medical Research Council’s Dietary Guidance for Children and Adolescent”. The dental examinations were organized through a dental receptionist to mask the dental examiner. The outcome measure, the cumulative incidence of S-ECC, was calculated by the US National Institute of Health recommendations to standardize the findings.

Stratified randomization was used according to the general socioeconomic status of children by drawing lots to test group or control group (Rong et al., 2003). Oral health education sessions were conducted by teachers in kindergarten who received oral health education by a dentist for every 3 months. The education materials were used by a commercial oral health industry. Blinding to examiners in the visual tactile examinations was maintained in the study. In order to maintain intra-examiner reliability, one extra duplicate examination was conducted with every ten children.

Detailed randomization procedure was not discussed in Sgan-Cohen et al.’s study (2001). All nurses participated were provided with in-service training and instructed
to fill in the checklist in order to monitor the standardized oral health messages.

However, nurses usually have their individualistic approaches in providing health education to specific targets. Uniformity would not be maintained throughout the program. To avoid the parents to give desired answers to satisfy oral health staff during the surveys, blinded interviewers were trained and were presented as the representatives of Municipal Public Health Services Department instead of focusing on dental services. This was to minimize any potential bias.

In Slade et al.’s study (2011), stratified randomization was performed according to three characteristics of the communities: (1) timing of community consent; (2) population size; and (3) geographic region. Block-allocated by a statistician using “Stata software” was performed randomly within each stratified community to have equal numbers of control and intervention communities. Standardized training was provided to health care workers regularly and supported with DVD instruction and chart books for the application of fluoride varnish to ensure proper record keeping of each procedure. However, potential bias might be resulted from the high turnover rate of health staff as reported. Regards to the data outcome measures, the eight examiners were trained with a calibration program including standardized protocol, instruments and procedures. Inter-examiner reliability was measured during data collection with replicated examinations. Accuracy and validity were thus assured.
Ethical considerations included informed, signed consent and ethical approvals were included in the seven RCTs.

**Dropout Rates**

RCTs studies were conducted over a period of time prospectively. A dropout rate of 20% or less is usually considered as acceptable but it also depends on the study period (Polit et al., 2008).

79.3% (3521 out of 4441) of the subjects were included in the final analysis and the drop-out rates ranged from 4.5% to 32.0% at 6 months to 5 years. Reasons of loss to follow up included family relocation, refusal, busy at work and personal affairs.

In general, the seven RCTs included randomization, blinding assessment and allocation concealment which minimized bias with high quality for an effective evidence-based practice.

**Data Summary and Synthesis**

The seven RCTs were large-scale studies in community-based settings such as kindergartens, community health centres and Maternal and Health Centres (MCHCs) with high quality and a low risk of bias (Feldens, et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Rong et al., 2003; Sgan-Cohen et al., 2001; Slade et al., 2011). The oral health education program was found to be effective in decreasing incidence of ECC and S-ECC. The incidence of S-ECC for an intervention
group (IG) was only 1.7% compared with the control group (CG) of 9.6% (Plutzer et al., 2008) and 29.1% (IG) compared with 42.7% (CG) with a p value <0.05 respectively (Feldens et al., 2010). Regards to the percentage of children developing new enamel caries (dc), 0% of new enamel caries was found in IG while 26% in CG (Mohebbi et al., 2009). Other three studies found a positive significant relationship in enhancing oral health knowledge, attitudes and oral health practices with a structured educational program (Martignon et al., 2006; Rong et al., 2003; Sgan-Cohen et al., 2001).

Dental caries are preventable and achievable. However, it may occur as early as the first eruption of tooth at six months and have a long-term consequence on the future dentition (American Academy of Pediatric Dentistry, 2009). Early preventive education program should be implemented as early as six months to provide a foundation to establish a lifetime preventive education on oral health (Feldens et al., 2010; Hamilton, Davis & Blinkhorn, 1999). Initiating professional oral health intervention is thus necessary to maintain oral health based on the developmental needs at different stages.

Regardless of the socioeconomic status of a family, children’s vaccination coverage in Maternal and Child Health Centres (MCHCs) is over 90% and thus it would be the best environment to contact parents or caregivers to initiate an early
intervention oral health program during the child health and vaccination sessions in general (Ip, Chan, Lee & Chow, 2008).

Improper feeding habits, socioeconomic factors, nutritional status, complicated pregnancies, ethnicity, low birth weights and traumatic births were the risk factors for early childhood caries and poor oral health (Begzati, Berisha & Mega, 2010; Grant et al., 2010). As a result, several elements are essential in constituting the community-based oral health program. The core contents included: (1) basic oral anatomy and etiology; (2) pathophysiology of ECC and clinical presentations; (3) oral hygiene and nutrition; (4) feeding habits; (5) importance of dental check-ups; and (6) toothbrushing technique (Feldens, et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Rong et al., 2003; Sgan-Choen, et al., 2001; Slade et al., 2011). Oral health information pamphlets and educational instructions are incorporated during child-health interviews and assessments (Feldens, et al., 2010; Hamilton, 1999; Mohebbi et al., 2009; Plutzer et al., 2008; Rong et al., 2003; Sgan-Choen, et al., 2001; Slade et al., 2011). Slide presentations and oral health workshops are organized monthly for voluntary participation and for high risk groups. Interactive activities such as toothbrushing practices and supervised toothbrushing technique with dummies, toothbrush and toothpaste are recommended for any misconceptions and clarifications (Martignon et al., 2006; Rong et al., 2003). Extra
attention should be paid on the high risk groups by assessing the risk of developing oral disease using a caries risk assessment from a health care provider in MCHCs. Referrals should be given by a medical officer if treatment is necessary to improve access to oral health care services for the benefits of early interventions.
Chapter 3: Implementation Potential

Evidence-based practice is a type of evidence-based healthcare in which to identify the research findings and implement them in practices to increase the quality of patient care (Polit & Beck, 2008). This can provide information to ensure efficient use of resources by identifying the most effective and efficacious interventions. An evidence-based practice guideline on oral health thus empowers primary healthcare workers to deliver a structured oral health education and updated information to the targeted population in a supportive environment. The reviewed studies have shown that an oral health education program has a significant effect on oral health improvements (Feldens et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Rong et al., 2003; Sgan-Cohen et al., 2001; Slade et al., 2011). Disseminating oral health information to targeted populations is one of the effective strategies to improve oral health for large population groups. The innovations should be considered in depth to achieve a balanced and realistic application of the practices (Polit et al., 2008). Thus, in order to determine the implementation potential of an oral health education program in Maternal and Health Care Centres (MCHCs) in Hong Kong, the transferability of the findings, the feasibility and the cost-benefit ratio of the innovation are discussed.
Target Audience and Setting

Oral Health is recognized as an important factor to overall general health. Optimal oral health is fundamental to an individual in overall social, physical and emotional well being (Abanto et al., 2011; Plutzer et al., 2008). Educational programs and workshops targeted per-school children and their caregivers are found to be effective in promoting oral health and in preventing early childhood caries (Feldens et al., 2010; Grant et al., 2010; Harris et al., 2004; Martignon et al., 2006; Mohebbi et al., 2009). Initiating an oral health education during their subsequent child health visits with primary healthcare workers thus serves as a foundation to a lifetime preventive education for ensuring optimal oral health (Narksawat et al., 2011).

The targeted audience of the innovation consists of pre-school children and their caregivers. Pre-school children registered in MCHCs are without serious congenital abnormalities. Their caregivers must be a Cantonese speaker and have the ability to read and understand Chinese.

The Family Health Service in Hong Kong with 31 MCHCs provide a comprehensive range of health promotion and disease prevention services for babies and children from birth to 5 years old with regular visits at new born, 1 month, 2 month, 4 month, 6 month, 12 month, 18 month, 24 month and 48 months through an integrated child health and development programme, parent education and
immunizations (Family Health Service, 2011). There are over 90% of children born in Hong Kong attended MCHCs and thus the majority of the children would be benefit from the innovation (Ipetal., 2008). One of the MCHCs situated in New Territories will be included as the target setting. There are fifteen registered nurses and two enrolled nurses in total. Seven of the registered nurses held the public health qualifications and they will be responsible for the innovation. Around 2500 pre-school children and their caregivers would be benefited from the innovation annually.

Transferability of the Findings

With respect to the transferability of the findings in implementing a community-based oral health education program for pre-school children and their caregivers in the current MCHC settings, four major areas should be focused before the implementation. These include types of clinical settings, philosophy of care, sufficient clients being benefited and difficulties in evaluation (Polit et al., 2008).

In the seven reviewed studies, all of them are high quality overseas randomized controlled studies with four RCTs were rated as level I evidence with high quality and a very low risk of bias (1++) (Feldens, et al., 2010; Mohebbi et al., 2009; Rong et al., 2003; Slade et al., 2011). Two RCTs were rated as (1+) with low risk of bias (Martignon et al., 2006; Sgan-Cohen et al., 2001). Another RCT study with higher risk of bias with high quality was rated as (1-) (Plutzer et al., 2008). In despite of the
overseas studies, the cultural factor is an independent variable of the significant findings.

All of the intervention programs in the reviewed studies were conducted in community-based settings and the main education providers were all primary health workers. Five of them provided the interventions in primary health care centres (Feldens, et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Sgan-Choen, et al., 2001; Slade et al., 2011), one of them is in a teaching hospital (Plutzer et al., 2008) and the other one study is in kindergarten (Rong et al., 2003). As the nature of the proposed setting is similar to the reviewed studies, the findings can be transferred to the proposed intervention. In addition, there are 31 MCHCs over different regions in Hong Kong. It would be easily accessible for the targeted populations. With respect to the types of clients, as the MCHCs in Hong Kong provide comprehensive service to clients from birth to 5 years of age and their caregivers, this match with the target populations of the reviewed studies and is then transferrable (Family Health Service, 2011).

The mission and vision of Department of Health is to empower clients to improve their health through providing evidence-based, quality assured service, to upgrade service through innovation, flexibility and use of technology continuously, to enhance organizational and staff competence through training and continuous
professional development and to be the most valued service provider in promoting child and woman health in Hong Kong (Family Health Service, 2011). This meets the philosophy of care of the innovation as it aims to promote oral health education and enhance oral-health knowledge of pre-school children and their caregivers, and to provide comprehensive guidelines for primary healthcare workers in oral health education program.

Regarding the types of interventions, all of the reviewed studies are structural educational interventions. The majority of the intervention involved both children and their caregivers during the health education sessions (Feldens, et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Rong et al., 2003; Sgan-Choen, et al., 2001; Slade et al., 2011). One of the seven studies solely involved participation of children during the education sessions with tooth brushing under supervision (Rong et al., 2003). Two studies provided oral health educational sessions with leaflets by healthcare staffs in public health centres with additional reminder phone calls or consultations (Mohebbi et al., 2009; Plutzer et al., 2008). Structured health educations and leaflets with toothbrushing activities or workshops for their caregivers were included in the other two studies (Martignon et al., 2006; Sgan-Cohen et al., 2001). One of the included studies provided free 0.25ml Duraphat fluoride varnish on dental caries with an organized community oral health promotion program (Slade et al.,
Another study consisted of nutritional advice based on the “Ten Steps to Healthy Feeding” (Feldens, et al., 2010). This kind of educational intervention is then transferrable and applicable to the current settings of MCHCs with workshops, pamphlets and oral health talks. In addition, clients can acquire both oral health knowledge and practical skills through interactive workshops between facilitators and participants.

The planning stage of the innovation will start from September to December which is in non-peak season. This includes the set up of the task force, the designs of working protocols and materials, the affirmation of operational goals and training for staffs and feedbacks. The Gantt chart is shown in Table 4. The presence of one or more decayed, missing or filled tooth surfaces scores (DMFS) in any primary tooth and the oral health knowledge from Oral Health Survey 2000 (Department of Health, 2001) of the caregivers will be used as evaluation. Details of the implementation plan and evaluation tools will be discussed in the next chapter.

By 2020, the Department of Health (DH) aims to achieve over 65% of caries-free 5-year-old children and this can probably decrease the burdens of health care system in various aspects. As over 90% of children attend MCHCs in Hong Kong, a large number of clients can be benefited from this innovation and it helps to achieve the goal of the DH in the near future.
<table>
<thead>
<tr>
<th>Months</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeks</td>
<td>wk 1</td>
<td>wk 2</td>
<td>wk 3</td>
<td>wk 4</td>
</tr>
<tr>
<td></td>
<td>1/10-5/10</td>
<td>8/10-12/10</td>
<td>15/10-19/10</td>
<td>22/10-26/10</td>
</tr>
<tr>
<td></td>
<td>5/11-9/11</td>
<td>12/11-16/11</td>
<td>19/11-23/11</td>
<td>26/11-30/11</td>
</tr>
<tr>
<td></td>
<td>3/12-7/12</td>
<td>10/12-14/12</td>
<td>17/12-21/12</td>
<td>24/12-28/12</td>
</tr>
<tr>
<td>Set up task force</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design working protocol and materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affirm operational goals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training of staffs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gather feedback and evaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Feasibility

Tooth decay is the most common chronic childhood disease and affects a child’s ability to speak, eat and learn. As it is preventable, much of the focus of this infectious disease is on the prevention of caries in pre-school children and education of their caregivers (Martignon, et al., 2006). However, healthcare system in Hong Kong is filled with uncertainty and challenges nowadays. Insufficient time on the job to implement new ideas has always been identified as the key barrier in healthcare system. There is an urgent need for the health care provider to understand the barriers, facilitators and the importance in translating research evidence into best practices in a time-efficient manner with the new innovation.

Various concerns and barriers should be focused to address the feasibility before the implementation. These include the freedom of implementation, organization and administrative support, staffs and resources availability, training and facilities availability, relative workload and the evaluation tools.

Organization Aspects

With respect to the rapidly changing healthcare environment with short staffing, cost reductions, limited resources and heavy workloads, the implementation of a change in organizational and individual level can be a complex process (Polit et al., 2008). Department of Health, as the most valued service provider in the leadership role in child and women health, is willing to change and ready to accept new innovations (Family Health Service,
2011). To gain support and approvals from the DH, a presentation with evidenced-based interventions of the reviewed studies and their findings will be given to the managerial level to increase their sense of urgency-significance of oral health education with the current problems. Besides, as various healthcare professionals do not work as alone, particularly in the Department of Health, any changes in a clinical practice have to discuss and communicate with the centre-in-charge practitioners, nurse administrators and senior nursing officers. Nurse administrators have a pivotal role to play in organizing clinical practice meetings and resource allocations. A proposal will thus be given to the nurse administrators for the implementation plan details with relative local barriers and potential facilitators. A senior nursing officer will help to integrate all essential elements of the oral health programme with various departments as a collaborative position.

**Staff Aspects**

Since there are “Brighter Smiles Playland Visitation Program” and “Brighter Smiles for the New Generation Oral Health Promotion Program” organized by Oral Health Education Unit of Department of Health, some of the staffs may display resistance to deliver another oral health program with extra efforts and workloads (Oral Health Education Unit, 2011). In order to induce change in professional behavior, awareness of the innovation should be promoted as the first priority (Polit et al., 2008).

A presentation addressing the current problem with statistics and research findings,
implementation plan of the intervention and the significance of changes in oral health education should be focused to stimulate their interest and involvement. Knowledge and skills will be provided to create better understanding and to develop insight into the innovation. Conversations are essential for staffs to express their concerns, hesitations and misperceptions. The positive outcome of the innovation will also increase the job satisfaction and professional nursing images (Polit et al., 2008).

**Staff Training**

As the registered nurses working in MCHCs are the major educators in conducting health education, workshops and support groups, they have to be equipped with oral health care knowledge, plus counseling and practical skills. They must be knowledgeable about child health developments which include nutrition, growth and the interaction with oral disease. However, the majority of nursing staff have not yet attended any of the oral-health related courses. A working group with five committees which include a Medical Officer in-charge, Nursing Officer in-charge, Nursing Officer, Registered Nurse and Enrolled nurse will be established to guide the change, help to plan, implement and coordinate these efforts and work together with the proposed vision and strategy. They are responsible to organize “train-the-trainer” workshops and provide support for staffs to explore the areas of concern, to empower the staffs and to develop a vision of how the programme can be improved. Skills seminars and workshops will be offered to enhance oral health related knowledge and
practical skills. One-to-one sessions are organized to explain the desired practice change and individual counseling skills. A meeting will be held on a monthly basis to gather feedbacks on the innovation and persistent actions plans will be created. During the training period, part-time Registered Nurses will be recruited to ease the workload. The relative documents and guidelines will be stored in an easily accessible location for references in each centre.

**Resources**

The Family Health Service collaborates with OHEU and Health Information System Unit (HIS) to redesign the updated pamphlets and videos for the pre-school children and their caregivers. Other oral health education aids such as structure of tooth, tooth brushing model and the process of dental caries model can be borrowed from OHEU. Sponsorship can be sought from the main oral health industry such as toothbrush and toothpaste combo sets as souvenirs. Dental check up with subsides will be collaborated with private dentists.

**Cost-Benefit Ratio**

**Potential Risks to Clients**

As it is an educational programme with workshops so there is no potential risk and adverse effect to clients, and it is considered as a safe practice.

**Potential Benefits to Clients**

Oral Health is recognized as an important factor to overall general health. Optimal oral health is fundamental to an individual in overall social, physical and emotional well-being.
(Abanto et al., 2011; Plutzer et al., 2008). Four major domains are characterized the quality of life of children—physical symptoms, function status, psychological functioning and social functioning. Even if the initial caries is asymptomatic, the severe caries in the primary dentition could probably affect the permanent successor development. ECC may also affect both children’s general health and development significantly (D’Mello et al., 2011; Yen, et al., 2010). Poor oral health and oral diseases during childhood may pose a negative impact on their life and their caregivers (Plutzer et al., 2008). Chewing difficulties may occur and thus may result with decreased appetite and malnutrition. In addition, ECC related toothache and infections may affect children’s learning abilities, developments, peer interactions, low self-esteem and decrease in school’s performance (Martignon et al., 2006). This may worsen the psychological and emotional conditions of children.

Since the most common lifetime habits are established during early childhood and the prevention of early childhood caries is accrued through early childhood interventions, a community-based setting as MCHCs are the ideal setting to provide oral health promotion and education intervention to support the primary socialization of pre-school children. This then can improve their quality of life and to ensure optimal oral health.

**Other Benefits**

From the social perspective, the medical and treatment costs will be lower if the implementation is in success. According to the American Academy of Pediatric Dentistry in
2009, operations and restorative treatment cost for ECC range from $1500-$2000 US dollars per child per year under Medicaid expenditures.

**Costs**

As a two-hour oral health individual training session is needed for five registered nurses, a part-time registered nurse is recruited for the releasing of staff. The average wage for a part-time registered nurse is $111 per hour and thus the total cost will be approximately $1110. For better understanding of the oral health knowledge, the total costs of the printing materials and DVDs production will be around $3000. The in-used equipments including computers, projector, and video players will be shared within the centre. Other oral health education aids such as structure of tooth, tooth brushing model and the process of dental caries model can be borrowed from OHEU. For evaluations, each dental screening will costs about $80 for each child. The proposed sample size for pilot testing is around 300 children and thus costs $24000. The total costs of the innovation will be approximately $28110.
Chapter 4: Evidence-Based Guidelines

Preventive interventions can probably produce the greatest cost savings and long-term benefits. Oral health education thus serves as a foundation of preventive education and dental care (Narksawat et al., 2011). Primary healthcare workers are usually the one who provide the earliest primary care for the children and their caregivers in early years. However, the healthcare professionals in the Department of Health have very limited training in oral health. An evidence-based guideline, for the primary healthcare workers, can provide a more specific guidance to standardize nursing care in achieving the caries-free goals and in promoting dental health care.

Overview of the Guidelines

Guideline Title

The guideline title is “A community-based programme in oral-health education targeted at pre-school children and their caregivers in Hong Kong.”

Aim of the Guideline

The aim of this guideline is to provide a structured framework for MCHC staff to implement a standardized oral health education program.

Objective of the Guideline

The objective of the guideline is to offer the most effective educational and promotional strategies in oral health for pre-school children and their caregivers.
**Target Population**

The target population includes pre-school children (aged two to five) and their caregivers. Pre-school children must be registered in the MCHCs without any serious congenital abnormalities. Their caregivers must be Cantonese speakers and have the ability to read and understand Chinese.

**Intervention Guidelines and Protocols**

The programme will be divided into two sessions - Theory-based lecture (45 minutes) and Interactive Workshop (30 minutes). The theory-based lecture will be presented with a PowerPoint which includes the basic knowledge of dental caries and the prevention strategies. The second session of interactive oral health workshop offers interactive oral health promotion information to deliver oral health messages effectively. The workshops begin with a brief introduction on the prevention of dental caries. There are four stations - Tooth shapes and functions models, tooth brushing demonstration, health eating models, and plaque recognition. These give the caregivers an opportunity to participate and work together to learn the value of oral health through interactive games. A five minute return demonstration and explanation of each station is given as reinforcement of oral health message (Sgan-Cohen et al., 2001; Rong et al., 2003; Martignon et al., 2006). A combo set of toothbrush and toothpaste will be given to each participant as souvenirs.

Recommendations are derived from the reviewed studies and only grade A
recommendations are included in this protocol according to the Scottish Intercollegiate Guidelines Network (2008).

Recommendations

**Recommendation 1.0 - introduction of oral anatomy**

It is suggested that educating children with information such as the basic structure and the stage formation of primary dentition can enrich their knowledge on oral anatomy (Plutzer et al., 2008). Any delay of eruption and completion of primary dentition is emphasized to rule out any pathological causes. A primary tooth model is shown to the caregivers as reinforcement (Martignon et al., 2006; Plutzer et al., 2008; Rong et al., 2003).

**Recommendation 2.0 - development and pathophysiology of dental caries**

The risk factors that cause ECC, the process and consequences of dental caries should be discussed for improving their oral health knowledge (Plutzer et al., 2008, Rong et al., 2003). Decayed primary teeth pictures are illustrated to draw attentions from the audiences. The early signs and symptoms are discussed to allow early management of dental caries (Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Rong et al., 2003; Slade et al., 2011).

**Recommendation 3.0 - prevention of dental caries**

3.1 *Refrain from using bottle as pacifier*

3.2 *Refrain from sleeping with bottle*
3.3 *Encourage using trainer cup at the age of six months and stop using the bottle at the age of one*

The acid-producing bacteria metabolize the lactose in the bottle of milk quickly and for a longer period of time if the child drinks milk from a bottle, sleep with bottle or as a pacifier. This poses the children’s teeth into the risk of cavity causing bacteria (Feldens et al., 2010; Mohebbi et al., 2009; Rong et al., 2003; Sgan-Cohen et al., 2001). The prolonged period of low pH level with low salivary secretion foster the loss of tooth minerals and cause tooth decay. Faster swallowing from a trainer cup reduces the contact time of teeth with the acid. Other strategies such as music listening, story-reading or stay beside them are encouraged at bedtime as comforting (Feldens et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Rong et al., 2003; Sgan-Cohen et al., 2001; Slade et al., 2011).

3.4 *Avoid juice or other sweetened beverages*

The significant amount of sugars in juice or other sweetened beverages pose risks to dental caries as the bacteria metabolizes sugars into acids, lowers the pH level and causes enamel dissolution. Avoid sugar-containing beverages such as soft drinks, fruit juices and chocolate milk and encourage frequent drinking of water to dilute acid content (Feldens et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Rong et al., 2003; Sgan-Cohen et al., 2001; Slade et al., 2011).

3.5 *Avoid frequent snacks or sweets*
Frequent snacking or sweets break down into fermentable carbohydrates. Bacteria on teeth produce acids from fermentable carbohydrates. The frequent snacks or sweets indicate the prolonged sustainability of low pH level and cause dental caries. Avoid fermentable carbohydrates snacks include cookies, bread, potato chips and cakes. Try to limit between-meal snacks and only high water content snacks encouraged such as fruits and vegetables which can help stimulate production of saliva and dilute acids (Feldens et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Rong et al., 2003; Sgan-Cohen et al., 2001; Slade et al., 2011).

**Recommendation 4.0- oral hygiene instructions**

4.1 Start tooth brushing when the first primary teeth erupt by using a small head with a soft-bristled toothbrush twice a day

Maintaining oral hygiene is important to control dental plaque. Tooth brushing is one of the most effective ways in preventing dental caries. Tooth brushing should be started as early as the first primary teeth erupt to establish an oral cleansing habit (American Academy of Pediatric Dentistry, 2009; Plutzer et al., 2008). A soft-bristled toothbrush with a small head should be used to prevent any gum damages. Twice daily brushing is recommended under supervision. Caregivers play a vital role in the tooth brushing procedure to ensure proper oral cleansing and safety. Tooth brushing before bed and after bed is recommended (Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Sgan-Cohen et al., 2001; Slade et al.,
Recommendation 5.0- instructions of fluoride toothpaste

5.1 Use appropriate fluoridated toothpaste of 1000ppmF

Fluoride toothpaste of 1000ppmF is recommended to prevent excessive consumption of fluoride. A smear-sized amount of toothpaste can be used under two years old as soon as the child could split out but not swallow the toothpaste. For children who are over two years old, a pea-sized amount of fluoride toothpaste can be used in tooth brushing (Ammari, Bloch-Zupan & Ashley, 2003; Birebrock et al., 2001; Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Sgan-Cohen et al., 2001; Slade et al., 2011).

Recommendation 6.0- importance of dental check-up

6.1 First dental check-up at one year old or the first tooth erupt

6.2 Regular dental check-up every six months

To initiate an early dental check-up plays an important role in maintaining optimal oral health. The first dental check-up is recommended as the first tooth erupts, at six months of age and no later than one year old. The regular dental check-up should be made every six months. The developing primary dentition can then be monitored by a dental care professional for any unrecognized oral disease, the early identification of any risk factors of ECC, and provide proper managements and counseling (Sgan-Cohen et al., 2001).
Chapter 5: Implementation Plan

Health care is filled with uncertainty. This can be reduced by using an evidence-based practice by healthcare providers to achieve high quality patient care. In today’s rapidly changing healthcare environment with short staffing, cost reductions, limited resources and heavy workloads, the implementation of a change in organizational and individual level can be a complex and lengthy process. It is favored by using multiple strategies and the organizational factors and individual factors are needed to be addressed (Carey, Buchan & Sanson-Fisher, 2009). Healthcare professionals should be made aware of the proposed planned changes, the rationale behind and the evidence for the innovation to be implemented (Doherty, 2006). Opportunities are provided to them for expressing their hesitations and concerns about the implementation plan. An effective implementation plan requires a structured approach in communication with potential stakeholders and pilot testing before the full implementation to create a shared understanding atmosphere among the healthcare providers.

Potential Stakeholders

In addressing the implementation of the innovation, various practical concerns and barriers are needed to be considered. This requires a great effort among those who drive the implementation, from the top senior leaders to the junior healthcare professionals, and across boundaries between and within various departments (Fineout-Overholt, Williamson,
The organization culture of the Department of Health is a top-down dissemination culture. On the medical side, it includes the Principal Medical Officer, Senior Medical Officer, Medical Officer in-charge, and Medical Officer. On the nursing side, it includes Principal Nursing Officer, Chief Nursing Officer, Senior Nursing Officer, Nursing Officer in-charge, Nursing Officer, Registered Nurses and Enrolled Nurses.

For the innovation to be implemented, approval and consensus must be obtained from the Head Office of Department of Health. The resources and detailed guidelines will be provided from the Central Health Education Unit (CHEU) once the approval is obtained.

**Communication Plan**

Communication is a key to success in the innovation implementation to identify the vision and their respective role in promoting oral health care for both the managerial and staff levels. A mix of individual, organizational and general system strategies is necessary for the implementation of guidelines to overcome barriers with detailed planning and step-by-step suggestions for implementation (Carey, Buchan & Sanson-Fisher, 2009). In order to induce changes, awareness of innovation should be promoted as the first priority to solicit their support and their agreement with the innovation (Polit & Beck, 2008). Knowledge translation will thus be effective if a well-designed strategy is being used (Doherty, 2006). A 30 minute detailed PowerPoint presentation of the proposal will be given at the conference room of the Head office in Department of Health to increase their sense of urgency-significance with the
current findings from the reviewed studies and local statistics in oral health education. The benefits associated with the changes, potential barriers, implementation plan, evaluations, possible solutions and the feasibility of the proposed innovation are provided to obtain approvals, manpower resources and financial funding among senior administrators before proceeding to the pilot test. A written guideline with details of the innovation together with the results obtained from the literature search, the identified articles and list of references will be submitted to the managerial level for approvals.

Some individuals may display resistance to extra deliver an oral health programme with extra efforts (Doherty, 2006). To initiate a change in the current practice, apart from the detailed presentation, information such as a hard copy of the guideline summary must be clearly delivered to the healthcare providers for references (Carey, Buchan & Sanson-Fisher, 2009). Since nurses working in the MCHCs are the major educator in conducting health education, workshops and support groups, they have to be equipped with sound oral health care knowledge, counseling and practical skills. A working group will be established to facilitate the implementation to ensure the consistency of the delivered message. Five committees within the group which include a Medical Officer in-charge, Nursing Officer in-charge, Nursing Officer, Registered Nurse and Enrolled nurse will be responsible to plan, guide the change, implement and coordinate these efforts and work together with the proposed vision and strategy with the provided resources.
Since the Nursing Officer in-charge and the Medical Officer in-charge are the main clinic-level administrators in each MCHC, they will be consulted in the routine meeting of the working group for comments of the proposed innovation to gain further support. Five registered nurses by voluntary basis will be selected in one of the New Territories East (NTE) MCHCs as a guiding team in their respective center. A training workshop consists of a PowerPoint lecture and interactive workshop will be organized for these registered nurses of oral health care which include the oral anatomy, pathophysiology of early childhood caries, nutrition, caries prevention, knowledge sharing, video demonstration and practical skills for the “train-the-trainer” programme. A one-to-one return demonstration will also be included to ensure the standardization of the practical skills. The training session will last for three hours. This “train-the-trainer” programme will be recorded by digital video recorders as a reference. At the end of the training, a sharing session will be held to facilitate conversations to express their difficulties and concerns for the programme implementation. One-to-one sessions will be organized to explain the desired practice change and individual counseling skills to solid the new information and knowledge provided. A programme review will be performed according to their comments and feedbacks from the healthcare professionals and will then incorporate the valued insights and opinions for evaluation. Comments obtained from the reviewed of the programme will be submitted through the regional Senior Nursing Officer to the cluster Senior Medical Officer, and eventually to the Principal Medical Officer. For the
other nurses in the MCHC, the information and resources of the innovation will be provided to them for enhancing their self-awareness towards the future implementation.

Resources serves as a reminder and knowledge refreshment for the proposed guidelines as references for the healthcare professional (Doherty, 2006). Five resource manuals with updated information and pamphlets are provided in a central easily accessed location for the staff’s quick references. Another pocket-sized quick reference manual will be distributed to every nurse with summarized key points as a warm-reminder. Free electronic access to databases, full-text journal articles and research journals relevant to clinical practice will be provided to the healthcare providers for their active participation in all aspects of the implementation process and skills in evidence-based practice.

Listening to the perspectives of the healthcare providers with respects and acceptance is essential to overcome the resistance during any changes. To sustain the changes of the innovation, a monthly-sharing session will be held for all the healthcare providers to express their thoughts, encountered difficulties, and the updated information (Polit & Beck, 2008). Comments obtained will be recorded as minutes for the modification of the innovations to be a user-friendly and comprehensive guideline (Fineout-Overholt et al., 2011). Successful stories and comments will be highly recommended and will be submitted to the monthly Family Health Service Newsletter to establish a stepping stone for future changes in other MCHCs. Positive successful outcomes and stories from the clients will be shared to increase
their job satisfaction and as an incentive to sustain the change of the innovation (Carey, Buchan & Sanson-Fisher, 2009).

**Pilot Testing**

Pilot testing is essential before the full implementation of the intervention. It is used to determine the feasibility of the innovation in a community healthcare setting and to avoid unexpected difficulties of the innovation (Melnyk & Fineout, 2008). Refinements will be made before the widespread dissemination. Guidelines will be revised for the appropriate units after the evaluation of the proposed changes.

Senior management level of the Head Office from Department of Health will be consulted for the feasibility of the innovation. The pilot test will be started once the application of approval is successful with the formal documentary proof. A working group will be established to facilitate the implementation to ensure the consistency of the message delivered. Five committees within the group include a Medical Officer in-charge, Nursing Officer in-charge, Nursing Officer, Registered Nurse and Enrolled nurse. The resources and detailed guidelines will be provided from the Central Health Education Unit (CHEU) once the approval is obtained.

One of the MCHCs situated in the New Territories is chosen for the pilot test. There are three medical officers, three nursing officers, fifteen registered nurses and two enrolled nurses in total. Seven of them held the public health qualifications. Five of the registered
nurses with public health qualifications will be recruited as the major task force in the innovation. They would have increased competence and confidence in the full implementation stage after the pilot testing.

The pilot test comprises of two parts. The first part is to test the “train-the-trainer” programme in which the selected five registered nurses will be trained by the working group. A training workshop consists of a PowerPoint lecture and interactive workshop will be provided to these registered nurses for disseminating information on oral health care such as knowledge in oral anatomy, pathophysiology of early childhood caries, nutrition, caries prevention, knowledge sharing, video demonstration and practical skills for this “train-the-trainer” programme. A return demonstration of practical skills in oral hygiene is necessary to ensure proper information and techniques are delivered throughout the workshop. This training session will last for three hours. Another one hour “one-to-one session” will be conducted to explain the desired practice change and individual counseling skills to solid the new information and knowledge provided. All the participants will be given a comprehensive oral health education manual and a pocket size manual for quick reference with summarize key points and techniques. Early feedback allows refinement of the innovation and the detection of knowledge deficits can enhance staff motivation (Carey, Buchan & Sanson-Fisher, 2009). A focus group interview and a satisfaction scale will thus be used for gathering feedback and modifications of the “train-the-trainer” programme.
The second part of the pilot test is to test the guidelines implementation. It was suggested that thirty to forty subjects are necessary for a pilot study (Melnyk & Fineout, 2008). A total of three weeks are required to recruit participants for the pilot test. The targeted participants include both the pre-school children and their caregivers. The pre-school children must be registered in the MCHC without any serious congenital abnormalities. Their caregivers must be a Cantonese speaker and have the ability to read and understand Chinese. Another three weeks will be required for data collection and analysis. The eligible participants will be given a cover letter in explaining the purpose and the confidentiality of the pilot study with an informed consent will be explained. The programme will last for one and half hour dividing into two sessions. The first session is a PowerPoint theory-based lecture which lasts for forty-five minutes. This includes oral health education on an introduction of oral anatomy, development and pathophysiology of dental caries, prevention of dental caries, oral hygiene instructions, and the importance of dental check-up. The second session is a thirty minutes interactive workshop which includes four stations of tooth shapes and functions models, tooth brushing demonstration, health eating models, and plaque recognition games. This gives an opportunity for the caregivers to solid their oral health knowledge. A five minute return demonstration will be given as a reinforcement of the oral health message. A combo set of toothbrush and toothpaste will be given to each participants as souvenirs.
It is important to study the effectiveness of the pilot study and the feasibility that incorporated in the innovation into MCHC. Process evaluation will be performed to elicit the opinion of the healthcare provider on the innovation and the implementation process. The training evaluation questionnaire for the healthcare providers (Appendix D) will incorporate the valued insights and opinions modifications of the training. Another group review meeting will then be arranged at the end of pilot test to gather feedbacks, logistics and the difficulties encountered in the MCHC.
Chapter 6: Evaluation Plan

To evaluate the effectiveness of the programme, the patient outcomes, healthcare providers’ outcomes, and system outcomes will be assessed. The nature and number of participants, recruitment plan, data analysis and criteria for effectiveness will also be discussed.

Intervention Outcomes

Patient Outcomes

There are one major primary outcome and two secondary outcomes in identifying the patient outcomes of the innovation. The reviewed studies showed that there is a significant positive relationship to decrease the visible plaque index (short-term) and dmft score (long-term) with oral health education interventions regardless of the socioeconomic variables (Feldens, et al., 2010; Martignon et al., 2006; Mohebbi et al., 2009; Plutzer et al., 2008; Rong et al., 2003; Slade et al., 2011). The visible plaque index, the major primary outcome, is to identity the percentage of teeth surfaces covered with dental plaque by visual examination in assessing the teeth cleanliness and will be assessed six months after the innovation. The dmft index, the first secondary outcome, is to identity the level of tooth decay and will be assessed one year after the innovation. These two dental examinations will be carried out in one of the civil servants’ dental clinic in NTE of the Department of Health with spare dental check-up quotas. The examinations will be organized in routine schedule to
assist blinding the examiners. Another three reviewed studies found a positive effect in the enhancement of oral health knowledge, attitudes and habits of the caregivers with effective interventions (Martignon et al., 2006; Rong et al., 2003; Sgan-Cohen et al., 2001). The oral health knowledge, attitudes and habits of the preschool children and their caregivers will be assessed as the second secondary patient outcomes in the innovation according to the Dental Health Survey from the Department of Health in 2001 (Appendix C).

**Healthcare Provider Outcomes**

In assessing the healthcare provider outcomes of the programme, the recruited registered nurses will be required to answer a questionnaire to evaluate the usefulness of the course, applicability and the suggested improvements with a Likert scale, ranging from “not useful at all” to “very useful” and other open-ended questions (Appendix D).

**Clients to be Involved**

**Nature of Participants**

The targeted participants of the innovation consist of pre-school children (aged two to five) and their caregivers. The pre-school children must be registered in MCHC without serious congenital abnormalities. Their caregivers must be a Cantonese speaker and have the ability to read and understand Chinese. An explanatory letter and consent form will be given to the caregivers before their participation in this programme.
Number of Clients

The number of participants required will be calculated based on the primary outcome of the visible plaque index. The mean visible plaque index of the preschool children in Hong Kong was 23.5% (Department of Health, 2001). The study of Martignon, et al (2006) found that the baseline of the visual plaque index was 60% and was reduced to 49% at six months with an effect size of 18.3%. In order to achieve 80% statistical power to identify an absolute difference of 25% decrease in the level of visual plaque index at the significance level of 0.05, the known value is assumed to be 23.5% and the proportion in the population to be sampled is 17.6%. An estimated sample size of 381 will be required by the means of statistical software calculation. After accounting for a loss to follow-up rate of 25-30%, approximately 500 participants will be required.

Recruitment Plan

The monthly number of preschool children attending one of the NTE MCHCs is around 200. A total of 500 participants will be recruited to attend the oral health education programme at one of the NTE MCHCs. Twelve weeks will be needed to recruit sufficient participants to participate in the innovation. The recruiting procedure will be launched between the first week of July and the fourth week of September in which the caretakers have more spare time to attend the education programme. The dental examinations of major primary outcomes in visual plaque index and the first secondary outcome in dmft index will
be carried out in one of the civil servants’ dental clinic in NTE of the Department of Health with spare dental check-up quotas. The follow-up assessment will be carried out at six month later in March the following year and one year later in September the following year to evaluate the effectiveness. A telephone reminder call and an invitation letter will be sent to maximize the compliance.

**Data Analysis**

The data will be analyzed by a computerized Statistical Package for Social Science version 20.0 (SPSS) software.

**Data Collection**

The background information of the participants will be collected at the end of the oral health programme. This includes the following information:

1) Name of child
2) Date of Birth
3) Place of Birth
4) Gender
5) The main caregiver
6) Monthly income of the family
7) Education level of the caregiver

The major primary outcome of visual plaque index will be collected in January the
following year and the dmft index will be collected in August the following year in one of the NTE civil servants’ dental clinics by the chief dentist. The data collected will be analyzed with SPSS by a statistician in the Department of Health.

**Data Evaluation**

Since we have large sample size \((N \geq 30)\), a two-tailed dependent z-test will be used to determine whether the visual plaque index is reduced or increased after the implementation of the oral health programme compared with the known population parameters from Dental Health Survey of Department of Health in 2001 (Department of Health, 2001). A two-tailed non-directional z test will be used to assess if there is a difference existed in either direction between two dependent proportions.

**Criteria for Effectiveness**

The goal of the innovation is to promote oral health and prevent early childhood caries targeted at preschool children and their caregivers in Hong Kong. To assess the effectiveness of the innovation, the major primary patient outcomes will be evaluated. The visible plaque index, which is used to identify the percentage of teeth surfaces covered with dental plaque by visual examination, in assessing the teeth cleanliness. The dmft index, the second major outcome, is used to identify the level of tooth decay. Since the visual plaque index is the major processors for early childhood caries, measure of the effectiveness of the guideline will be based on whether the program can achieve at least 75% of more participated preschool
children have a 25% reduction in the visible plaque index when compared with the score in the Dental Health Survey 2001. If the program can achieve this target, it will be considered as successful.

**Conclusion**

The early childhood caries has received little attention from both healthcare professionals and their caretakers. However, the dental caries is the most common chronic infectious transmissible dental disease in children results from the overgrowth of tooth-adherent specific bacteria and it can produce significant impact on the quality of the life for pre-school children and their caregivers (American Academy of Pediatric Dentistry, 2009). The education programmes and workshops can serve as an effective measure in promoting oral health in pre-school children.

With regular child health visits in MCHCs, this is the ideal opportunity for the healthcare professionals to provide oral health information, preventive treatments and encouragement with the client in improving the oral health of pre-school children. However, some of the healthcare professionals may display resistance in initiating the change with the increased workloads with the innovation. A well-planned multiple implementation strategy is a key to success with a user-friendly protocol, establishment of core working group, training workshops and resources for health professionals. Audits and feedbacks are important to sustain the change with refinements. A pilot testing will provide the information on the
feasibility of the innovation in a community healthcare setting and to avoid unexpected difficulties of the innovation before the widespread dissemination (Melnyk & Fineout, 2008).

Outcomes will be defined and assessed upon the evaluation of the study for the effectiveness of the innovation. With the result obtained, it is hoped that the implementation of a community-based programme in oral health education targeted at pre-school children and their caregivers in Hong Kong would be beneficial to the clients in MCHCs.
**References**


knowledge, attitudes and self-reported behaviors among 3-5 years old school children using an oral health and nutrition intervention. *The Journal of Clinical Pediatric Dentistry, 35*(1), 59-64.


Vanagas, G., Milasauskiene, Z., Grabauskas, V. & Mickeviciene, A. (2009). Associations between parental skills and their attitudes toward importance to develop good oral hygiene skills in their children. Medicina (Kaunas), 45(9), 718-723.


**Appendix A**

SIGN 50 Methodology Checklist 2: Randomized Controlled Trials

<table>
<thead>
<tr>
<th>Methodology Checklist 2: Controlled Trials</th>
</tr>
</thead>
</table>

**Study identification**  
(*Include author, title, year of publication, journal title, pages*)

**Guideline topic:**  
**Key Question No:**

Before completing this checklist, consider:

1. Is the paper a **randomized controlled trial** or a **controlled clinical trial**? If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist. If it is a **controlled clinical trial** questions 1.2, 1.3, and 1.4 are not relevant, and the study cannot be rated higher than 1+.

2. Is the paper relevant to key question? Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

**Reason for rejection:** Reason for rejection: 1. Paper not relevant to key question □ 2. Other reason □ (please specify):

Checklist completed by:

**SECTION 1: INTERNAL VALIDITY**

<table>
<thead>
<tr>
<th>In a well conducted RCT study…</th>
<th>In this study this criterion is:</th>
</tr>
</thead>
</table>
| 1.1 The study addresses an appropriate and clearly focused question. | Well covered  
Adequately addressed  
Poorly addressed |
| 1.2 The assignment of subjects to treatment groups is randomised | Well covered  
Adequately addressed  
Poorly addressed |
| 1.3 An adequate concealment method is used | Well covered  
Adequately addressed  
Poorly addressed |
### 1.4 Subjects and investigators are kept ‘blind’ about treatment allocation
- Well covered
- Adequately addressed
- Poorly addressed
- Not addressed
- Not reported
- Not applicable

### 1.5 The treatment and control groups are similar at the start of the trial
- Well covered
- Adequately addressed
- Poorly addressed
- Not addressed
- Not reported
- Not applicable

### 1.6 The only difference between groups is the treatment under investigation
- Well covered
- Adequately addressed
- Poorly addressed
- Not addressed
- Not reported
- Not applicable

### 1.7 All relevant outcomes are measured in a standard, valid and reliable way
- Well covered
- Adequately addressed
- Poorly addressed
- Not addressed
- Not reported
- Not applicable

### 1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?

### 1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis)
- Well covered
- Adequately addressed
- Poorly addressed
- Not addressed
- Not reported
- Not applicable

### 1.10 Where the study is carried out at more than one site, results are comparable for all sites
- Well covered
- Adequately addressed
- Poorly addressed
- Not addressed
- Not reported
- Not applicable

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

#### 2.1 How well was the study done to minimise bias?
*Code ++, +, or −*

#### 2.2 Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the
### SECTION 3: DESCRIPTION OF THE STUDY

**3.1** Do we know who the study was funded by?

- Academic Institution
- Healthcare Industry
- Government
- NGO
- Public funds
- Other

**3.2** How many centres are patients recruited from?

**3.3** From which countries are patients selected?

(Select all those involved. Note additional countries after "Other")

- Scotland
- UK
- USA
- Canada
- Australia
- New Zealand
- France
- Germany
- Italy
- Netherlands
- Scandinavia
- Spain
- Other:

**3.4** What is the social setting (ie type of environment in which they live) of patients in the study?

- Urban
- Rural
- Mixed

**3.5** What criteria are used to decide who should be INCLUDED in the study?

**3.6** What criteria are used to decide who should be EXCLUDED from the study?

**3.7** What intervention or risk factor is investigated in the study? (Include dosage where appropriate)

**3.8** What comparisons are made in the study (ie what alternative treatments are used to compare the intervention with). Include
74

dosage where appropriate.

<table>
<thead>
<tr>
<th>3.9</th>
<th>What methods were used to randomize patients, blind patients or investigators, and to conceal the randomization process from investigators?</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.10</td>
<td>How long did the active phase of the study last?</td>
</tr>
<tr>
<td>3.11</td>
<td>How long were patients followed-up for, during and after the study?</td>
</tr>
<tr>
<td>3.12</td>
<td>List the key characteristics of the patient population. Note if there are any significant differences between different arms of the trial.</td>
</tr>
<tr>
<td>3.13</td>
<td>Record the basic data for each arm of the study. If there are more than four arms, note data for subsequent arms at the bottom of the page.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Arm 1:</th>
<th>Arm 2:</th>
<th>Arm 3:</th>
<th>Arm 4:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment:</td>
<td>Treatment:</td>
<td>Treatment:</td>
<td>Treatment:</td>
</tr>
<tr>
<td>Sample size:</td>
<td>Sample size:</td>
<td>Sample size:</td>
<td>Sample size:</td>
</tr>
<tr>
<td>No. analysed</td>
<td>No. analysed</td>
<td>No. analysed</td>
<td>No. analysed</td>
</tr>
<tr>
<td>With outcome:</td>
<td>With outcome:</td>
<td>With outcome:</td>
<td>With outcome:</td>
</tr>
<tr>
<td>Without outcome:</td>
<td>Without outcome:</td>
<td>Without outcome:</td>
<td>Without outcome</td>
</tr>
<tr>
<td>Primary outcome?</td>
<td>Primary outcome?</td>
<td>Primary outcome?</td>
<td>Primary outcome?</td>
</tr>
</tbody>
</table>

| 3.14 | Record the basic data for each IMPORTANT outcome in the study. If there are more than four, note data for additional outcomes at the bottom of the page. |

<table>
<thead>
<tr>
<th>Outcome 1:</th>
<th>Outcome 2:</th>
<th>Outcome 3:</th>
<th>Outcome 4:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value:</td>
<td>Value:</td>
<td>Value:</td>
<td>Value:</td>
</tr>
<tr>
<td>Measure:</td>
<td>Measure:</td>
<td>Measure:</td>
<td>Measure:</td>
</tr>
<tr>
<td>P value</td>
<td>P value</td>
<td>P value</td>
<td>P value</td>
</tr>
<tr>
<td>Upper CI</td>
<td>Upper CI</td>
<td>Upper CI</td>
<td>Upper CI</td>
</tr>
<tr>
<td></td>
<td>Lower CI Primary outcome?</td>
<td>Lower CI Primary outcome?</td>
<td>Lower CI Primary outcome?</td>
</tr>
<tr>
<td>----</td>
<td>--------------------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>3.15</td>
<td><strong>Notes.</strong> Summarise the authors conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question. <em>(Much of this is likely to be contributed by GDG members).</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B:
SIGN Levels of Evidence and Grades of Recommendations

Levels of evidence

1++ High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+ Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1- Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++ High quality systematic reviews of case control or cohort or studies
   High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+ Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2- Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3 Non-analytic studies, e.g. case reports, case series
4 Expert opinion

Grades of recommendations

A At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or
   A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results

B A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or
   Extrapolated evidence from studies rated as 1++ or 1+

C A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or
   Extrapolated evidence from studies rated as 2++

D Evidence level 3 or 4; or
   Extrapolated evidence from studies rated as 2+
Appendix C

Dental Health Survey

1. How often did your children brush?
   a. Three times daily or more
   b. Twice daily
   c. Once daily
   d. Less than once daily

2. Did your children receive parental assistance while they brushed?
   a. Never
   b. Sometimes
   c. Always

3. Was fluoride toothpaste used?
   a. Yes
   b. No
   c. Don’t know

4. How often did you give your children snacks daily? (Snacks referred to any food, snack or drink except water, any intake in between normal meals)
   a. None
   b. Once
   c. Twice
   d. Three time or more

5. What is/are the factor(s) leading to tooth decay? (You can choose multiple answers)
   a. Lack of calcium
   b. Frequent eating
   c. No regular dental checkup
   d. No brushing with toothpaste
   e. Improper toothbrushing
   f. No brushing in the morning and at night
   g. Too much candies or sweet food
6. What is/are the factor(s) leading to gum disease? (You can choose multiple answers)
   a. “reqi” internal heat
   b. Lack of vitamin/ malnutrition
   c. Smoking
   d. No regular dental checkup
   e. Improper toothbrushing
   f. Not brushing in the morning and at night
   g. No flossing

7. What is/are the method(s) to prevent tooth decay? (You can choose multiple answers)
   a. Flossing
   b. Take calcium supplement
   c. Reduce frequency of food/drink intake
   d. Regular dental checkup
   e. Brushing with fluoridated toothpaste
   f. Proper brushing
   g. Brushing in the morning and at night
   h. Reduce candies and sweet food

8. What is/are the method(s) to prevent gum disease? (You can choose multiple answers)
   a. Use medicated toothpaste
   b. Good nutrition
   c. Avoid smoking
   d. Regular dental checkup
   e. Proper toothbrushing
   f. Brushing in the morning and at night
   g. Flossing

9. What is/are the benefit(s) of fluoride? (You can choose multiple answers)
   a. Prevent tooth decay
   b. Prevent gum disease
   c. Whiten teeth

10. What is your preferred treatment for the decayed primary teeth in your children?
    a. Restore if possible
    b. Leave it
    c. Extraction
d. Don’t know
e. Seek advice

11. What is your perception on the oral health of your children?
   a. Very good
   b. Good
   c. No opinion
   d. Bad
   e. Very bad

12. Did your children cover with dental schemes?
   a. Yes
   b. No

13. Have you ever bring your children for a dental visit?
   a. Yes
   b. No

Background Information
14. Name of Child:
15. Date of birth: ____/____/____ (DD/MM/YYYY)
16. Place of birth: Hong Kong/ China/ Others, please specify:__________
17. Gender: M/F
18. The main caregivers of your child:
   a. Parents
   b. Grandparents
   c. Domestic helper
   d. Others, please specify:__________
19. Monthly family income (in HK dollars):
   a. $<$5000
   b. $5001-10000
   c. $10001-15000
   d. $15001-20000
   e. $20001-25000
   f. $25001-30000
   g. >$30001
20. Education level of caregivers:
   a. No schooling
   b. Elementary school
   c. Secondary school
   d. Higher diploma or Degree holders
   e. Master degree or above
Appendix D
Training Evaluation for Health Professionals

1. What are the three most important things you learned during this training?
   a. 
   b. 
   c. 

2. What presentation styles were the most effective for you? (For example, case studies, role play, lecture, quiz, and workshop?)

3. Please provide one example of how your practice will change as a result of this training (if any).

4. Please rate the training in terms of its impact and usefulness in the following areas, using the scale below.

   1 = Not useful at all                           5 = Very useful

<table>
<thead>
<tr>
<th>Area</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Manual</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Presentation material by trainers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Useful in your daily work</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Increase your willingness to train and mentor others</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Increase your ability to train and mentor others</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

5. What additional assistance will you need to be able to implement what you have learnt in this training?

6. Please share any other comments you have that would help us to strengthen or improve this training: