ASSESSMENT OF ATTITUDES AND KNOWLEDGE OF GENERAL DENTAL PRACTITIONERS IN PROVIDING IMPLANT MAINTENANCE

Miss Aimwalee Rudeejaraswan

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Oral and Maxillofacial Surgery
Department of Oral and Maxillofacial Surgery
Faculty of Dentistry
Chulalongkorn University
Academic Year 2018

การประเมินทัศนคติ และความรู้ของทันตแพทย์ทั่วไปในการให้การดูแลรักษารากฟันเทียม

น.ส.เอมวลี ฤดีจรัสวัลย์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาศัลยศาสตร์ช่องปากและแม็กซิลโลเฟเชียล ภาควิชาศัลยศาสตร์
คณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2561

Thesis Title	ASSESSMENT OF ATTITUDES AND KNOWLEDGE OF GENERAL DENTAL PRACTITIONERS IN PROVIDING IMPLANT MAINTENANCE
By	Miss Aimwalee Rudeejaraswan
Field of Study	Oral and Maxillofacial Surgery
Thesis Advisor	Assistant Professor Keskanya Subbalekha, DDS., Ph.D.
Thesis Co Advisor	Assistant Professor Pagaporn Pantuwadee Pisarnturakit, DDS., M.Sc., Dr.P.H.

Accepted by the Faculty of Dentistry, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Science

..... Dean of the Faculty of Dentistry

(Assistant Professor SUCHIT POOLTHONG, DDS., Ph.D.)

THESIS COMMITTEE

..... Chairman

(Associate Professor ATIPHAN PIMKHAOKHAM, DDS., Ph.D.)

..... Thesis Advisor

(Assistant Professor Keskanya Subbalekha, DDS., Ph.D.)

..... Thesis Co-Advisor

(Assistant Professor Pagaporn Pantuwadee Pisarnturakit, DDS., M.Sc., Dr.P.H.)

..... External Examiner

(Associate Professor Sirichai Kiattavorncharoen, MD., DDS., Dr.med.)

เอมวลี ฤดีจรัสวัลย์ : การประเมินทัศนคติ และความรู้ของทันตแพทย์ทั่วไปในการให้การดูแลรักษารากฟันเทียม. (ASSESSMENT OF ATTITUDES AND KNOWLEDGE OF GENERAL DENTAL PRACTITIONERS IN PROVIDING IMPLANT MAINTENANCE) อ.ที่ปรึกษาหลัก : ผศ. ทญ. ดร.เกศ กัญญา สัพพะเลข, อ.ที่ปรึกษาร่วม : ผศ. ทญ. ดร.ผกาภรณ์ พันธุวดี พิศาลธุรกิจ

วัตถุประสงค์ของการศึกษานี้คือการสำรวจทัศนคติและความรู้ของทันตแพทย์ทั่วไปที่ปฏิบัติงานในประเทศไทยในการให้การดูแลรักษารากฟันเทียม โดยแจกแบบสอบถามออนไลน์แก่ทันตแพทย์ที่สำเร็จการศึกษาระดับปริญญาตรีระหว่างปีพ.ศ.๒๕๔๓ ถึง ๒๕๖๐ มีผู้ตอบแบบสอบถามทั้งหมด ๔๓๕ ราย โดยแบบสอบถามที่ได้รับการตอบอย่างสมบูรณ์จากผู้ตอบเพียง ๔๒๙ รายได้รับการนำมาวิเคราะห์ ผลการศึกษาพบว่ามีผู้ตอบแบบสอบถามเพศหญิงจำนวนร้อยละ ๗๖ เพศชายร้อยละ ๒๔ ผู้ตอบแบบสอบถามครึ่งหนึ่งมีอายุอยู่ในช่วง ๒๘-๓๓ ปี ร้อยละ ๗๘ มีประสบการณ์ในการทำงานเป็นทันตแพทย์ไม่เกินสิบปี ผู้ตอบแบบสอบถามจำนวนร้อยละ ๖๔.๓ และ ๕๙.๔ เห็นด้วยว่าการผ่าตัดฝังรากฟันเทียมและการบูรณะฟันบนรากฟันเทียมควรทำโดยทันตแพทย์เฉพาะทางรากฟันเทียมเท่านั้น ร้อยละ ๒๒.๔ เห็นด้วยว่าการดูแลหลังการบูรณะด้วยรากฟันเทียมควรทำโดยทันตแพทย์เฉพาะทางรากฟันเทียมเท่านั้น ร้อยละ ๘๘.๕ ยินดีที่จะให้การตรวจทั้งฟันธรรมชาติและรากฟันเทียม แต่อาสาสมัครเพียงครึ่งหนึ่งเท่านั้นที่จะให้การดูแลรักษารากฟันเทียม พบว่าทัศนคติและความรู้ของผู้ตอบแบบสอบถามมีความสัมพันธ์ไปในทิศทางเดียวกันอย่างมีนัยสำคัญทางสถิติ โดยผู้ตอบแบบสอบถามมีแนวโน้มในการให้การดูแลรักษารากฟันเทียมเพิ่มมากขึ้นตามระดับความรู้ นอกจากนี้ยังพบว่าทันตแพทย์ทั่วไปยังไม่ค่อยมั่นใจในการให้การดูแลรักษารากฟันเทียม ทั้งนี้อาจเกิดจากการที่มีความรู้และอุปกรณ์สำหรับการดูแลรักษารากฟันเทียมในสถานที่ปฏิบัติงานไม่เพียงพอ

สาขาวิชา	ศัลยศาสตร์ช่องปากและแม็กซิลโลเฟเชียล	ลายมือชื่อนิสิต .....
ปีการศึกษา	2561	ลายมือชื่อ อ.ที่ปรึกษาหลัก .....
		ลายมือชื่อ อ.ที่ปรึกษาร่วม .....

6075844432 : MAJOR ORAL AND MAXILLOFACIAL SURGERY

KEYWORD: Dental implant, Attitudes, Dental implant maintenance

Aimwalee Rudeejaraswan : ASSESSMENT OF ATTITUDES AND KNOWLEDGE OF GENERAL DENTAL PRACTITIONERS IN PROVIDING IMPLANT MAINTENANCE. Advisor: Asst. Prof. Keskanya Subbalekha, DDS., Ph.D. Co-advisor: Asst. Prof. Pagaporn Pantuwadee Pisarnturakit, DDS., M.Sc., Dr.P.H.

This study aimed to survey the attitudes and knowledge of Thai general dental practitioners (GDPs) in proving dental implant maintenance care. The online questionnaire was sent to Thai GDPs who graduated between 2000 and 2016. Of the returned 435 questionnaires, 429 completely filled were included for analysis. 76% of the participants were female and 24% were male. Half of the participants were aged 28-33 years old and 78% of the participants have been working as a GDP 10 years or below. There were 64.3% and 59.4% of the participants who agreed that dental implant surgery and restoration should only be obligated by specialists. Moreover, 22.4% agreed that dental implant maintenance care should be performed by specialists. The majority of the participants (88.5%) reported their willingness to give comprehensive oral examination on natural teeth and implant, only half of them (51%) would provide dental implant maintenance care. Significant positive correlation between attitudes and knowledge of the participants were found. GDPs tended to provide implant maintenance care according to their knowledge score. However, GDPs still felt less confident to provide dental implant maintenance care and treat the implant problems. These obstacles may be due to insufficient knowledge and not well-equipped practice setting.

Field of Study:	Oral and Maxillofacial Surgery	Student's Signature .....
Academic Year:	2018	Advisor's Signature .....
		Co-advisor's Signature .....

ACKNOWLEDGEMENTS

I would like to express my gratitude to many people for their contributions to this study. First of all, I would like to sincerely thank my advisor, Assistant Professor Dr. Keskanya Subbahekha for her guidance and valuable advices since the initial phase of this study. Her dedication and mastery had help me accomplished the course of this program both clinical and research project. Subsequently, my completion of this project could not have been achieved without the supports of my co-advisor, Assistant Professor Dr. Pagaporn Pantuwadee Pisarnturakit. Her insightful comments and thorough consultation throughout the project also supported me in developing the project. My gratefulness is extended to the expertise in dental questionnaires of Associate Professor Dr. Neeracha Sanchavanakit. I believed my questionnaires had been totally improved beyond my capability and expectation. In addition, I would like to express my gratefulness to my thesis chairman, Associate Professor Dr. Atiphan Pimkhaokham for his knowledges and refined comments which propelled my project enhancement. Furthermore, I would also like to offer my gratefulness to my thesis committee members, Associate Professor Dr. Sirichai Kiattavorncharoen for his deliberate opinions and guidance. I am really grateful that from beginning to end of this study, I have received a warm reinforcement and collaboration from all of my colleagues and the faculty members in the faculty of dentistry, Chulalongkorn university. Finally, I wish to thank my family for their support and encouragement throughout my master degree program and my whole life.

Aimwalee Rudeejaraswan

TABLE OF CONTENTS

LIST OF FIGURES

Page

LIST OF TABLES

Page

Chapter 1 Introduction

Background and rationale

Dental Implant therapy is now worldwide accepted as predictable and efficient therapy. The number of patients treated with dental implant increases dramatically in these three decades, since its availability in wide range of oral rehabilitation. (1, 2) Population surveys in Europe have revealed that practicing dentist will face more patients demands for implant reconstruction. (3) There is expected compound annual growth rate of dental implant and implant-related prosthetics is 7.96% during the 2017-2025 globally.(4) The 10 years outcomes has been reported that 92.4% survival rate , 69.8% success rate. (5)

Despite the high long-term survival rate, dental implants are not free from complications which may occur many years after installation. The complication rates in 10-16 years follow up period was 48.03% which implied that long-term follow-up care was needed after implant placement. (6) Another study has found that maintenance frequency was in concordance with implant survival rates and they also addressed a professional maintenance care at least once a year could prevent implant loss by 90%. (7) Concerning to peri-implantitis, prevalence of pathology arises with time in function. (8) From this point, an increase in number of implant being placed, implant related therapy become more essential part of daily dental practice and implant-related complications will be more common in the near future. (9) Accordingly, dental team should take responsibility of monitoring implant-related problems.

Adherence to maintenance care is critical for long-term dental implant survival especially in periodontally compromised patients. However, not all the patients comply with maintenance care program from the dentists who provided them the implant treatments due to some reasons. Therefore, many patients have to get their implant maintenance by general dental practitioners (GDP).(10-12) Hence, GDP should have correct attitudes and knowledge about implant care. Unfortunately,

there is insufficient scientific evidence to provide a gold standard protocol for prevention and treatment of peri-implant mucositis and peri-implantitis. The 1st European workshop on implant dentistry university education proposed that there was lack of integrity of the undergraduate dental implant curricula among difference university. (13)

According to aforementioned, we can expect that implant therapies are meant to be standard of care in the future. Therefore, it is imperative that general dental practitioners who give the first line dental care have to be capable in providing maintenance care for dental implant patient. Understanding their attitudes, responses, determinants and barrier to provide dental implant maintenance care may bring a standard dental implant care protocol for them and finally the better long-term outcome can be achieved.

Research questions

1. What are the attitudes and related factors of general dental practitioners in providing routine dental care of patients having dental implants who come for their dental check-up?
2. How do general dental practitioners' response to routine dental implant maintenance?
3. What are the obstacles of general dental practitioners in providing maintenance care of dental implants?

Objectives

1. To survey factors which are related to attitudes, knowledge and response of general dental practitioner in providing maintenance care for patients having dental implants.
2. To identify obstacles in providing maintenance care.

Hypothesis

General dental practitioners' attitudes and response to the patients having dental implant who come for dental check-up in their daily practice based on their knowledge, attitudes and experience about dental implant.

Research design

A descriptive cross-sectional questionnaire survey

Expected benefit

1. To improve the proper dental implant maintenance care program for implant patients.
2. To provide information for developing dental implant curriculum for undergraduate students to provide an effective maintenance program.
3. To identify daily practice obstacles of general dental practitioner providing maintenance care for implant patients.

Conceptual framework

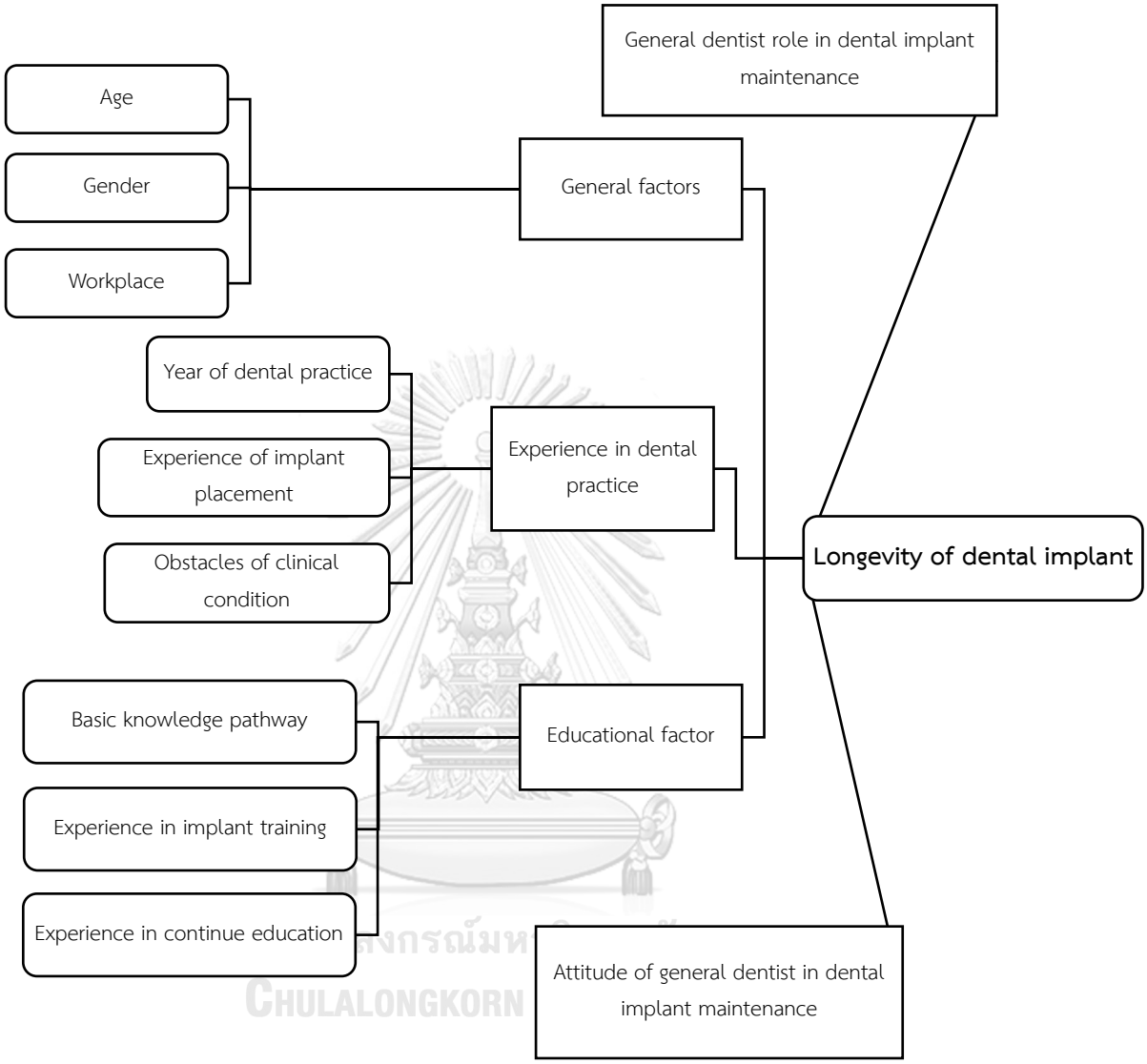


Figure 1 Conceptual framework

Chapter 2 Review of literature

Attitudes

Attitudes refers to a set of feeling, belief and behavior toward a person, objects or event. In social psychology, attitudes are composed of ABCs model; affect, behavior and cognition. Some attitudes are more likely to base on beliefs while some are tended to base on feelings and some on behaviors. Attitudes are found to be inherited or learned through experiences. However, affection is found to be the most influential part of attitudes. Attitudes are essential for mankind whereby effectively interact to environments.(14)

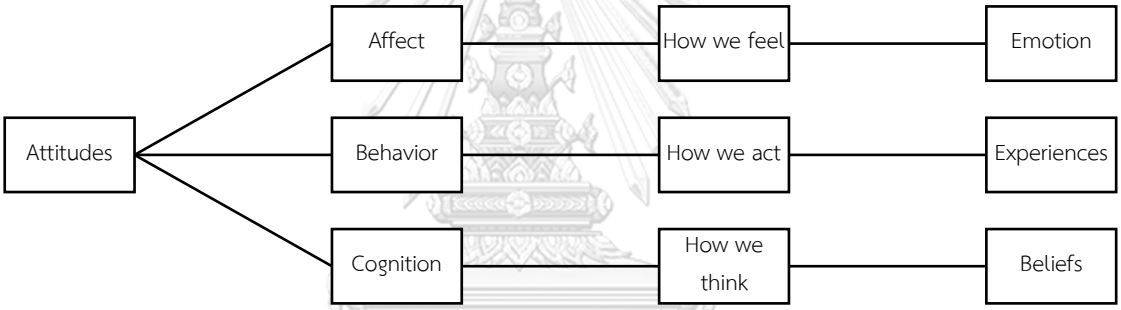


Figure 2 Composition of attitudes

People may have different set of attitudes on the same things. Personal positive or negative direct experiences toward attitudes object strengthen attitudes. (15) As such, strength of attitudes can be varied in several level; people hold on to strong attitudes when they considered such thing as important and these attitudes frequently guide their actions, sometime drive their action out of awareness. (16) Attitudes are firmly related to behavior.(17) Furthermore, the attitudes expressed on self-report measures significantly corelate with prospective behavior based on different components of attitudes according to the Meta-analyses of the attitude-behavior relation. (18)

Assessing attitudes

There is a general agreement that a person's attitude toward some objects has established a predisposition to response in favorable or unfavorable manner. Numerous methods have been used to measure attitudes. However, it is difficult to measure attitudes due to the reason that they are not actual object and unattainable to analyze by statistics straightaway.(19) Attitudes are mostly determined directly by self-report measurement or indirectly by reaction of arousal or facial expressions. (20)

The particular 2 methods using to measure attitudes are as followed.

1. Explicit methods which are inquiring direct questions about an attitude.
2. Implicit methods are indirectly taping into attitudes whereby participants
are usually unaware that their attitudes are being assessed.

Explicit methods are typically performed by construction of self-report questionnaire to a specific attitudes object and frequently scored by Likert scales. Likert scales comprise of a set of response alternatives. Thus, the participants are knowing that their attitudes are being observed.

Attitudes of general dental practitioners to dental implants

Lang-Hua et al.,2012 revealed that dentists' attitudes toward implant dentistry was associated with age, educational training factors and experiences in implant dentistry. All of these factors impacted their perception in different aspects involved with superiority of implant vs. conventional prostheses, outcomes of dental implant therapy, complications and maintenance and placement of implants. The respondents showed properly knowledge to complications and maintenance requirements but other findings of this study suggested that attitudes of general dental practitioners are not wholly in line with evidence-based knowledge.

Dental implant

Dental implant has become mainstream of restorative modality due to its wide range of utilization. Furthermore, increasing people's life expectancy and prevalence of tooth-loss rise with age imply that dentist might face more patient need implant treatment.(21) Implant dentistry has rapidly developed for decades and long-term outcome of treatment is favorable. However, dental implant still presents with complications which increase with time in function. Since the dentists are patient's primary source of information; thus, they should provide sufficient and accurate information including continual evaluation of treatment outcome. (8, 22)

Treatment outcome of dental implant

The outcome of dental implant treatment often describes in 2 terms as survival and success. (23)

-Survival of implant is commonly described that dental implant stay in its place in the oral cavity whether it is not free from disease or complications.

- Success rate is a term used to define dental implant success which has been proposed by several authors, the widely use criteria is proposed by Albrektsson et al. in 1979. According to this criterion the success implant should be clinically immobile, absent of peri-implant radiolucency or no more than 0.2 mm vertical bone loss annually after the first year and free from irreversible sign and symptoms of pain, infection, neuropathy or violation of mandibular canal.

Complication of dental implant

Complications which occur after successful osseointegration of dental implant can be categorized into 2 types based on affected components; biological and technical complications. According to Zembic et al.2014, the estimate 5 year rates for biologic complications was 6.4% and 11.8% for technical complications. (24)

1. **Biological complications**

From the consensus report of the sixth European workshop on periodontology in 2008 defined conditions which attribute from inflammation of supporting tissue around implant which mostly found after function as peri-implant mucositis and peri-implantitis. The disease is evidently corresponded to the periodontal disease since their etiologic factors, pathogenesis, risk assessment and treatment. Moreover, the present of biofilm containing pathogen could initiate both peri-implantitis and periodontitis.(25)

Peri-implant mucositis defined as reversible inflammation of peri-implant soft tissue without loss of supporting bone. The mean prevalence of peri-implant mucositis has been reported 43% of the implant patients in Europe, South and North America. (26) Clinical presentation includes bleeding on probing with light force (less than 0.25N) which is the most common sign of inflammation or peri-implant disease. This type of biologic complication is frequently found in patients who do not adhering to supportive periodontal therapy and implant maintenance. (8, 27, 28)

Peri-implantitis is irreversible inflammatory process of the mucosa with additional loss of supporting bone, prevalence 22% for peri-implantitis of the implant patients in Europe, South and North America. Due to the fact that peri-implantitis may arise from peri-implant mucositis, they have occasionally shared inflammatory characteristics of disease such as mucosal hyperplasia, suppuration/fistula, mucosal recession and increasing probing depth from base-line which associate with attachment and bone loss. Without treatment, these conditions would lead to complete loss of supporting bone. (29, 30)

Treatment of peri-implant disease could provide by non-surgical or surgical protocols both procedures aim to limit disease progression and reversal of inflamed to healthy peri-implant tissue.

Treatment of peri-implant mucositis, current evidence indicates that multi-disciplinary non-surgical therapy by eradication of plaque, calculus with appropriate instrument in conjunction with chlorhexidine mouthwash could reverse inflammation and re-establish healthy peri-implant tissue.(31-33) Furthermore, an application of local antibiotics could lower number of bleeding sites and probing depth. (34) Patient-administered plaque control is also critical in treating peri-implant mucositis as well as prevention measure. (35) At the present, there is recommendation that patient's risk factor assessment comprising residual periodontal pocket and smoking should be modified in conjunction with mechanical and chemical measures. (36)

However, treatment of peri-implantitis varies and lack of evidence to provide standard protocols. Treatment modalities include non-surgical and surgical therapy which reduce bacterial load or regenerate supporting bone. There is a number of methods in reducing biofilm and calculus from implant surface by mechanical debridement with carbon fiber or titanium curettes, air abrasive, ultrasonic with specialized tip and laser has been provided improvement of disease condition. These methods could be utilized with adjunctive antibiotic. Moreover, advance surgical access are sometime needed to sufficiently decontaminate of the implant surface and regenerative therapy of surrounding tissue. (37) Anyway, there are still limit evidence of the treatment efficacy. (30)

Prevention of peri-implantitis aims to prevent inflammation of peri-implant tissue and transformation of peri-implant mucositis to peri-implantitis. Currently, there is absence of evidence for standard prevention protocol for peri-implantitis. Moreover, the risk of disease changeover from peri-implant mucositis to peri-implantitis is raise with lacking of annual supportive therapy. Therefore, professional supportive care, patient compliance and additional patient-administered oral hygiene care are imperative. (38)

2. **Mechanical complications**

Mechanical or technical complications is a collective term used to describe structural component impairment. The common affected part of this type of complication is the superstructure such as screw loosening, fracture of screw, gap of the implant-abutment junction and fracture or deformation of supra-substructure are considered as mechanical complications. The most common mechanical complication is abutment screw loosening.(24) These types of complication may not directly related to failure of implant but occasionally associated with biological complications according to biofilm adherence to the improper position of the component which impair healthy environment for surrounding tissue. (39) Moreover, it is sensible to prevent technical complications by meticulous treatment planning right from the start. (24, 40)

Dental implant maintenance therapy

To achieve successful long-term outcome, maintaining integrity and health of surrounding tissue of implant after complete osseointegration is necessary. Proper self-administered oral hygiene care and professional maintenance visit are proven methods for prevention of implant loss. (38) Though, there is no standard protocol. It is recommended that dentist could preserve health of dental implant by systematic monitoring peri-implant soft tissue concurrent with prosthetic superstructures and early detection of disease.

Peri-implant pathologies share considerable disease conditions with periodontal disease which are chronic challenge with bacteria in the subgingival niche. It might be suggest that the management principles of peri-implantitis is closely comparable with periodontitis. (25)

Probing is crucial for evaluation of peri-implant tissue as a current tool for determine health and disease. Baseline probing depth at the time of

prosthetics insertion with probing depth evaluation at least once a year is implicated.(30) Probing depth of peri-implant tissue refer to the distance of probe tip in relation to the bone crest when using light pressure 0.25Ncm should average within 0.75±0.60mm. (41) Increase probing depth indicate loss of attachment while bleeding on probing is signified inflammation of peri-implant mucosa (30, 36) As a result of osseointegration, healthy dental implant should be absolutely immobile.

Peri-implant baseline radiograph is important not only for evaluation implant success but in monitoring crestal bone loss. During the first surgical year, a mean crestal bone loss of 0.9-1.6 mm while 0.02-0.25 mm in the following years are considered as one of the success criteria. (42)

Dental implant education

More demand of dental implants leads to increase number of dentists placing implant. Implant dentistry education and training has been popular worldwide. There is diversity in options for implant dentistry education from university, private course and implant company. In many universities in Europe, the undergraduate dental curriculum has incorporated implant dentistry in wide variation from theoretical knowledge to clinical experience. The general dental council in United Kingdom has launched a framework of undergraduate dental curriculum which is not only introduced implant dentistry as a treatment option but also mentioned noticing implant maintained in normal tissue. (43) However, there are still barriers about priority of implant dentistry in loaded curriculum and lack of consistency amongst universities. (44)

Undergraduate dental curriculum in Thailand has just integrated implant dentistry in the past decades. Unfortunately, the undergraduate dental students are unattainable in clinical experience of implant therapy.

General dental practitioner

This study aims to assess attitudes about dental implant maintenance of general dental practitioner who is providing routine dental care such as cleaning, dental check-up and oral hygiene instruction.

Chapter 3 Materials and methods

This study is a descriptive cross-sectional study to assess the attitude and response of general dental practitioner in providing dental implant maintenance care.

Ethical approval

This research was approved study protocol and consent form from the human research ethic committee of the Faculty of Dentistry, Chulalongkorn University in compliance with the ICH/GCP no.051/2018.

Sample selection

Dentists who were currently practicing in Thailand as general dental practitioners. The sampling frame was from the list of registered dentists of the Dental council of Thailand who had registered during 2000-2016.

Sample size calculation

Due to practice profile of dentists in Thailand was vary. Many of the dental specialist were provided both specialize procedures and general dental treatment. The target samples were Thai general dental practitioners who were currently providing general dental treatment in Thailand, regardless achieved specialist training or not. The sample size was calculated according to Yamane's formula. Hence, the population of this study were the registered dentist in Thai dental council from 2000-2016 which were 9490. The acceptance margin of error was .05. Thereby, the calculated samples were 383. This study included descriptive and frequency analysis of attitudes of general dental practitioner providing maintenance care for patients with dental implants. The samples are invited by e-mail to fill online questionnaires. Two separate reminders will be sent to participants. The sample size is estimated by Taro Yamane's formula with .05 margin of error. (45)

$$n = \frac{N}{1 + Ne^2}$$

where n = sample size

N = size of population

e = acceptable sample error

The result was 381 respondents.

Developing a set of questions

The main construct was derived from the interested factors that might relate to response, attitude and knowledge which consists of 4 parts:

1. Demographic data that possibly affected the outcome was collected. These include age, gender, year of practicing dentistry, Main workplace according to working hours in each week, number of patients that they have offered dental implant maintenance. Moreover, data about their dental implant education were gathered.
2. Responses when they met patients having dental implant come for dental check-up in their daily practice were asked.
3. The questions about attitude, knowledge, responses and barrier were designed by used a constructed questionnaire that was modified from 5 studies as followed:
    - Dental implant practice among Hong Kong general dental practitioners in 2004 and 2008 (46)
    - Specialists' management decisions and attitudes towards mucositis and peri-implantitis (47)
    - Attitudes of general dental practitioners towards implant dentistry in an environment with widespread provision of implant therapy (48)
    - Patient-centred perspectives and understanding of peri-implantitis. (49)
    - Maintaining dental implants-do general dental practitioners have the necessary knowledge? (50)

4. Knowledge associated to dental implant complications was measured by using the newly constructed questionnaires which included the statements about dental implant examination, diagnosis of peri-implant conditions and radiographic images of different dental implant complications. The knowledge questions and radiographic images were courtesy of Nikos Mattheos, Clinical Associate Professor of Implant Dentistry, The University of Hong Kong.

A list of statements, concerning the objective of the study is generated based on the result of qualitative research. In this study, the qualitative study will perform in registered GDP who is currently provide routine oral care in Thailand. The qualitative results are then summarized and organized into a set of items.

Determining the questionnaire format

The questionnaires were consisted of 3 formats which were multiple choices, multiple selection and Likert-type for obtaining the accurate result in identifying the attitude, Likert-type format ranging from 5 (= Strongly agree) to 1 (= Strongly disagree) was applied.

Score	Definition	
5	Strongly agree	เห็นด้วยอย่างมาก
4	Agree	เห็นด้วย
3	Neither agree or disagree	ไม่แน่ใจ
2	Disagree	ไม่เห็นด้วย
1	Strongly disagree	ไม่เห็นด้วยอย่างมาก

Initial validation by the experts and pilot study reliability

The questionnaires were reviewed by 3 experts: expert in implant dentistry, expert in dental questionnaire and general dentist. The name of the three experts was listed in the Appendix B. An enclosed envelope delivered by hand to each expert as follow.

1. Cover letter explaining the objectives of constructions and usage of questionnaire and the evaluation work requested
2. The full research proposal
3. The first draft questionnaire

The items were back-translated in Thai-English and English-Thai version and also assessed in terms of language, wording, content validity, and lay out of the questionnaire. The experts will be inquired to rate a score for each item. After test of content validity, the items were then edited for clarity according to experts' suggestion. There were 3 items that could be evaluated the content validity; 1. Dental implants should only be placed by a specialist, 2. Dental implants should only be restored by a specialist, 3. Dental implants should only be maintained by a specialist. The validity evaluation from the three experts reveled index of item objective congruence: 0.6, 0.6 and 1 respectively.

The pilot study was done for evaluation of reliability. The data was analyzed for the internal consistency using IBM SPSS Statistics for Windows, Version 22.0 (IBM, Armonk, NY). The calculation revealed the Cronbach's coefficient as 0.938.

Data collection

The Thai version of online questionnaires link was distributed in the Line messenger groups of Thai dentists and faculty of dentistry alumni. The data were collected by distributing standardized online questionnaires forms to the target groups. The online questionnaires link was distributed in the closed Line messenger groups of Thai dentists and faculty of dentistry alumni.

The questionnaire consisted of 4 sections:

1. Consent of willingness being the participants

2. Basic information of the participants included of dental implant education
   background

3. Attitudes and response in dental implant maintenance

4. Knowledge associated to dental implant complications.

Statistical method

Demographic data, education about implant dentistry, attitudes, responses in providing dental implant maintenance, attitudes and knowledge were analysed by descriptive statistic (frequencies and percentages). Attitudes and knowledge score were analysed in means and standard deviations. The attitudes points were reversed in the negative items “Dental implant last for life” and “Dental implants should only be maintained by a specialist” before analyzation. The relations of interesting factors were tested to observe association with dental implant maintenance attitudes, and knowledge. Statistical difference scale of 2 outcome variables was assessed by independent T-test and the outcome variables among more than 2 groups will be assessed by using one-way ANOVA with the test for homogeneity of variances followed by post-hoc analysis. The association of frequency of categorical and nominal data was assessed by Chi-square test. Data were analysed using IBM SPSS Statistics for Windows, Version 22.0 (IBM, Armonk, NY). A P-value < 0.05 will be considered statistically significant.

Chapter 4 Results

In total 435 dentists completed the questionnaires, 6 of them were excluded because they did not provide general dental procedures. Thus, this study was comprised of 429 valid samples.

1. Demographic data

The characteristic of the study subjects is shown in Table 1. Most of the participants were female (75.5%), aged between 28-33 years (50.1%). Most of them had experience in dental practice for 1-10 years. About half of them were working in a public hospital and primary healthcare unit (59.3%). Around 70% of the participants have met patients with dental implant less than 10 patients in the past six months.

Table 1 Demographic data

Demographics	N (n=429)	%
Age		
22-27	69	16.1
28-33	215	50.1
34-40	118	27.5
More than 40	27	6.3
Gender		
Female	324	75.5
Male	105	24.5
Year of practicing dentistry		
1-5	174	40.7
6-10	158	36.9
11-15	73	17.1
16-20	23	5.4
University of undergraduate degree in dentistry		
Government universities in Bangkok and Perimeter area	313	73.1
Government universities in another province	102	23.8
Private universities	13	3
Graduated aboard	0	0
Main workplace		
Public hospital and primary healthcare unit	254	59.3
Private hospital	26	6.1
Private dental clinic	44	10.3
University based dental clinic	104	24.3

Number of patients with dental implants that they met in the past 6 months		
None	29	6.8
1-5 patients	197	46
5-10 patients	109	25.5
6-20 patients	39	9.1
More than 20 patients	54	12.6

2. Education and experiences in implant dentistry

Regarding the dental implant knowledge acquisition, the participants reported that they have gained from post-graduate education (46.6%), undergraduate education (43.6%) and few of them had never learned about dental implant (4%). (table 2) The participants mostly acquired their basic knowledge about dental implant in the undergraduate education by lecture-base (97.5%) and hands-on or lab simulation (22%). The participants who had never learnt about dental implant in the undergraduate education reported that they acquired foundation knowledge from full-time formal curriculum in the university as the greatest frequency as 55.7%, part-time training course by implant company 44.3%, the textbook and journals 41.5%, academic part-time training course 33.5%, website 31.1%, consultation with specialist 27.8% and structural online course 5.7%. In this study, text book and journals were the most common reported source of further knowledge about dental implant (57.3%), website (51.7%), consultation with specialist (39.4%) and training course which organized by implant company (38.7%) respectively. For dental implant experiences, over half of the participants had never provided implant surgery (59%) or implant prosthesis (62.9%) and few of them had dental implant treatment themselves (4.2%).

Table 2 Education and experiences in implant dentistry

Education and experiences in implant dentistry	**N**	**%**
Acquisition of foundation knowledge in implant dentistry	(n=429)	
Never	17	4
Undergraduate education	200	46.6
Post graduate education	187	43.6
Self-directed learning	25	5.8

Learning modality about implant dentistry in the undergraduate education, (multiple selection)	(n=200)	
Lecture-base	195	97.5
Hands-on or lab simulation	44	22
Assisting staff/senior student	23	11.5
Treating patient under guidance of staff	3	1.5
Other	5	2.5
Learning modality about implant dentistry after undergraduate education (multiple selection)	(n=229)	
Full-time training	118	55.7
Training course which organized by implant company	94	44.3
Textbook and Journals	88	41.5
Academic part-time training course	71	33.5
Website	66	31.1
Consultation with specialist	59	27.8
Structural Online course	12	5.7
Acquisition of further knowledge about implant dentistry (multiple selection)	(n=429)	
Textbook and journals	245	57.3
Website	221	51.7
Consultation with specialist	168	39.4
Training course which organized by implant company	165	38.7
Full-time training	109	25.4
Academic part-time training course	85	20
None	45	10.5
Structural Online course	25	6.1
Experiences about dental implant	(n=429)	
None	217	50.6
Surgical placement and prosthesis restorations	123	28.7
Only surgical placement	53	12.3
Only prosthesis restoration	36	8.4
Be an implant patient	(n=429)	
	18	4.2

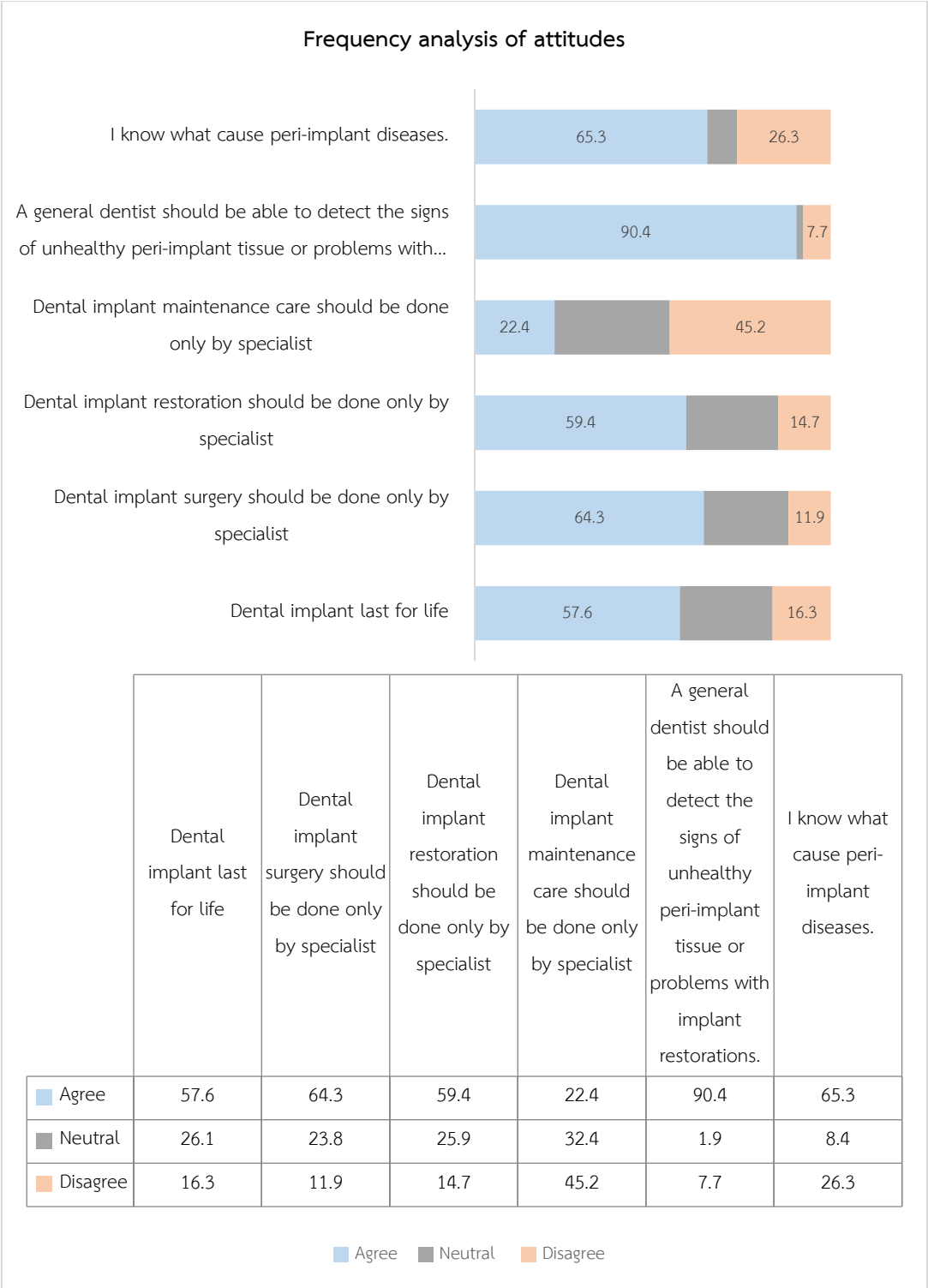
3. Attitudes and responses

The attitudes about dental implant are shown in the table 3. Most of the participants (65.3%) agreed that dental implant last for life with mean score of 3.54± SD 1.103. More than half of them, 64.3%, 59.4% agreed that dental implant surgery and restoration should only operate by specialist with mean score 3.78±SD 1.065 and 3.67±SD 1.088 respectively. Nevertheless, fewer of them (22.4%) agreed than disagreed (45.2%) that dental implant should be maintained by only specialist with mean score of 4.48±SD 0.766. Up to 90.4% of them agreed that a general dentist should be able to detect the sign of unhealthy peri-implant tissue or problems with implant restoration with mean score of 4.48±SD 0.766. 65.3% of the participants agreed that they know the cause of peri-implant diseases score 3.73±SD 0.941.

Next, how they respond when they met a patient with dental implant in their practice, 31% of them reported that they would provide a comprehensive oral examination and maintenance of dental implant/restorations, 20% reported to provide comprehensive oral examination, maintenance and treatment of problems including problems of dental implants/restorations, 37.5% reported to provide comprehensive oral examination but treat natural dentition and refer any treatment related to dental implant to the specialist and 17.4% reported to provide oral examination only and refer implant examination, maintenance and treatment to the specialist. Despite a great number of participants (89.6%) reported their willingness to provide comprehensive oral examination on natural teeth and dental implant, still, 48.9% of them would refer the patients to the specialist for implant maintenance. (Table 3) The reasons for those who did not provide implant maintenance care were insufficient knowledge/training or unfavorable practice setting.

Table 3 Attitudes about dental implant maintenance

Attitudes about dental implant maintenance	Mean	Mode	Std. Deviation
Dental implants last for life.	3.54	4	1.103
Dental implants should only be placed by a specialist.	3.78	4	1.065
Dental implants should only be restored by a specialist.	3.67	4	1.088
Dental implants should only be maintained by a specialist.	2.62	3	1.159
A general dentist should be able to detect the signs of unhealthy peri-implant tissue or problems with implant prosthesis.	4.48	5	0.766
I know what cause peri-implant diseases.	3.73	4	0.941



	Dental implant last for life	Dental implant surgery should be done only by specialist	Dental implant restoration should be done only by specialist	Dental implant maintenance care should be done only by specialist	A general dentist should be able to detect the signs of unhealthy peri-implant tissue or problems with implant restorations.	I know what cause peri-implant diseases.
Agree	57.6	64.3	59.4	22.4	90.4	65.3
Neutral	26.1	23.8	25.9	32.4	1.9	8.4
Disagree	16.3	11.9	14.7	45.2	7.7	26.3

Figure 3 Frequency analysis of attitudes

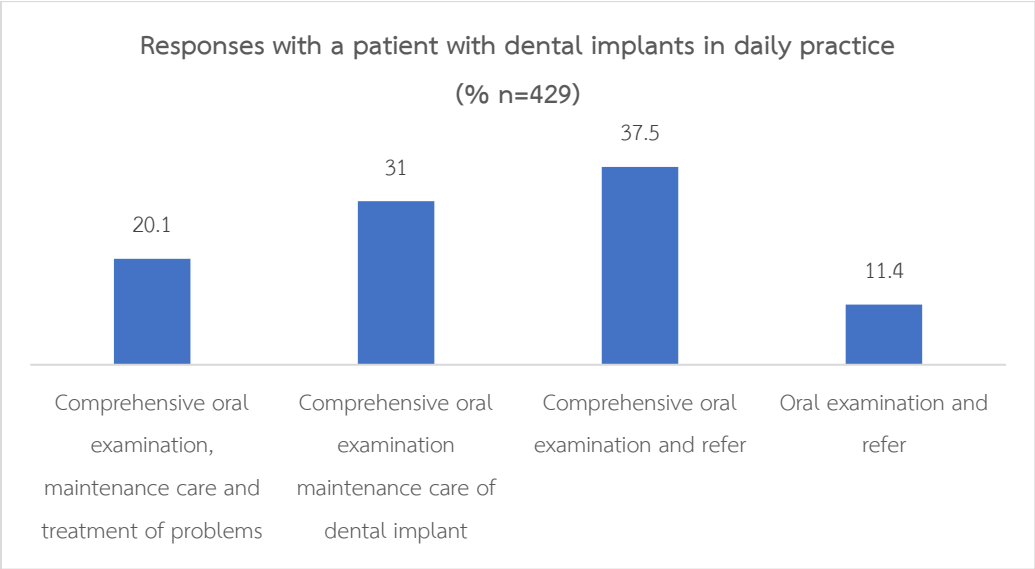


Figure 4 Frequency analysis of responses with a patient with dental implant

Table 4 Frequency analysis of responses and reasons about dental implant maintenance

Responses with a patient with dental implants in daily practice	**N (n=429)**	**%**
Comprehensive oral examination maintenance care of dental implant	133	31
Comprehensive oral examination, maintenance care and treatment of problems	86	20.1
Comprehensive oral examination and refer	161	37.5
Oral examination and refer	49	11.4
Reasons for not providing maintenance		
Insufficient knowledge and training	179	41.7
Practice setting is not appropriate	114	26.6
It is out of their responsibility	1	0.2
Other	9	2.1

4. Knowledge about dental implant examination

The answer profile of the 12 questions was differences among items, great number of participants (89.5%,91.8%) got the right answer in the question about periapical radiograph as a diagnostic tool for dental implant assessment of technical component and bone (table6). However, in the item 2, fewer number of the right answer was found (58.7%). The item 4, instruments that could be used with dental implants, there was 84.4% corrects. Bleeding on probing (BOP), 43.4% of the participants knew that absent of BOP implicate absent of peri-implant tissue inflammation and 15.6% of them perceived that BOP was the sign of peri-implant tissue inflammation. 19.8% of the participants noticed that a good set of peri-apical radiographs did not enough for diagnosed peri-implantitis. About peri-implantitis treatment outcome, 43.6% of the participants knew that clinical mobility of an implant could not improve after treatment of peri-implantitis. 11.4% perceived that there was no need to prescribe antiseptic mouth rinse to all the implant patients. 35.9% of the participants knew that metal probe was not contra-indicated. 96.7% of the participants were aware that improper design of implant restoration could lead to peri-implantitis and progressive bone loss.

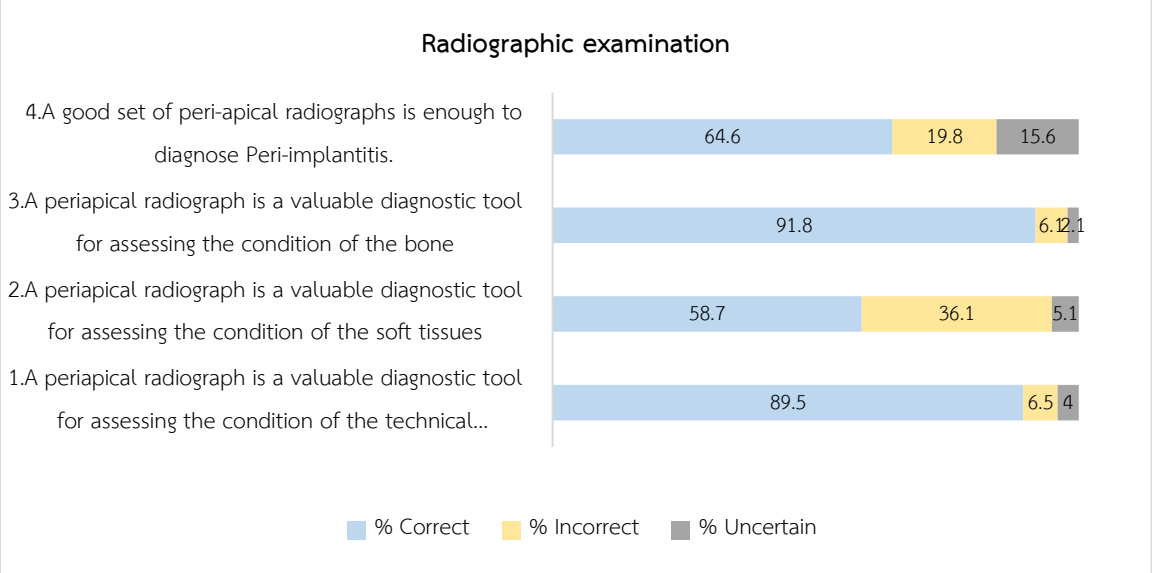


Figure 5 Knowledge-Radiographic examination

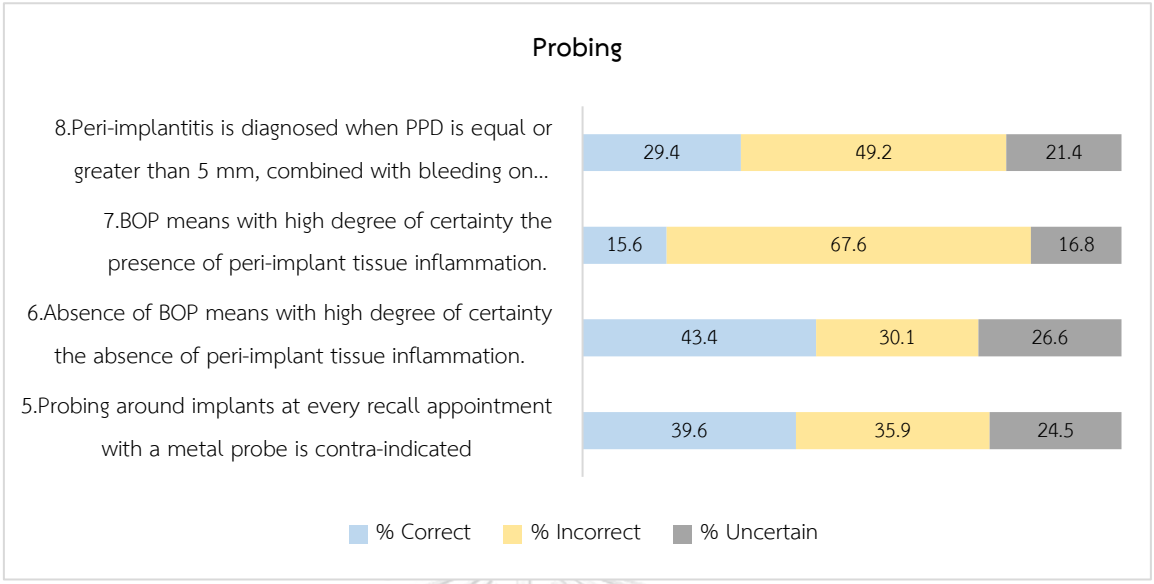


Figure 7 Knowledge-Probing

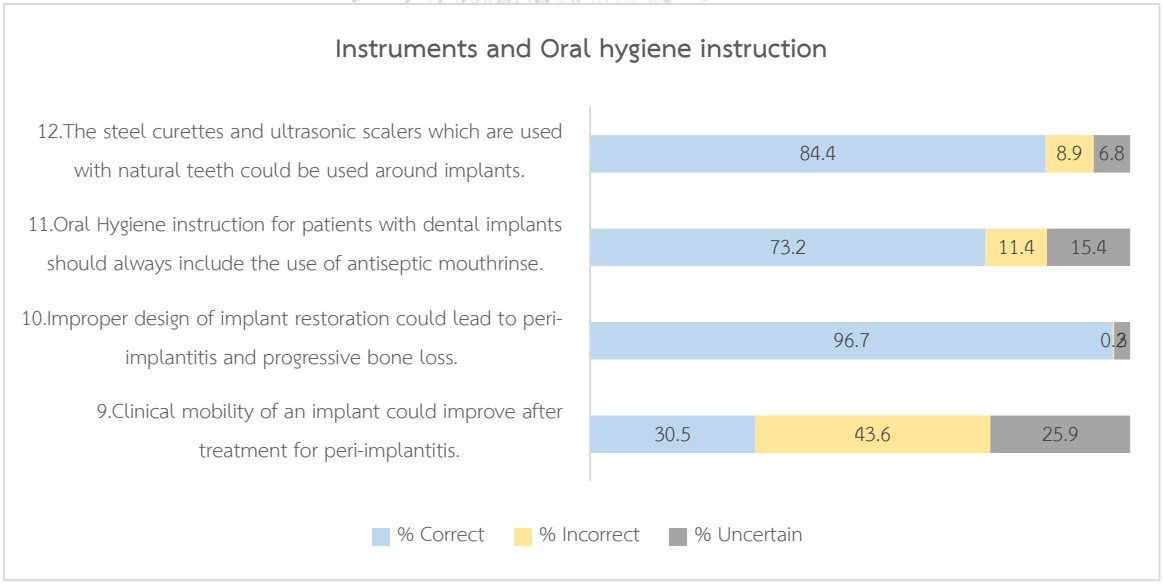


Figure 6 Knowledge- Instruments and oral hygiene instruction

Chapter 5 Discussion

This study is the first survey about dental implant maintenance in Thailand which represent current situation of practice profile of general dental practitioners in Thailand and also attitudes and knowledge of those general dental practitioners. The data from this study revealed that dentists graduated during 2000-2016 who provided general dental procedures included oral examination and tooth cleaning in Thailand most of them aged 28-40 years (77.6%) comparable with the survey in the UK (50) while work experiences were 1-10 years. (77.6%) The proportion of female to male dentist's ratio was on the contrary with previous studies in Hong Kong and Canada (46, 48, 51) which revealed a number of male practitioners 2-3 times greater than female. Notwithstanding, the gender proportion in this study was concordance with the data from registered dentists in Thai dental council between 2000-2016 which revealed a greater number of female dentists than male. More than half of the participants in this study graduated from the government universities in Bangkok and perimeter area. (73.1%) The main workplace according to working hours of the participants typically were public hospital and primary healthcare units (59.3%) unlike in previous mentioned study in Hong Kong and Canada which more than half of the participants were owning private practice. Despite the fact that, in general, practicing profile of Thai dentists are able to work in several sectors such as public hospital and private dental clinic, thus, large number of the participants are working in more than one sectors of Thai health care systems. The number of patients with dental implants they came across in their daily practice in the past 6 months frequently were 1-5 patients. (46%)

Implant dentistry education profile of the dentists in this study revealed up to 46.6% acquired their foundation knowledge in implant dentistry from formal university curriculum in undergraduate level by means of lecture-based (97.5%) in agreement with the recent international survey which reported 70%-85% of the respondents had their implant training from didactic/lecture or theory-based. (52) About other half of participants in this study (43.6%) reported that they acquired in

postgraduate level by means of full-time training (55.7%). Textbook and journals were the most frequent reported source of further information about dental implant as well as information from website (57.3%,51.7% respectively). Half of the participants did not involve in neither dental implant surgery nor restoration. Meanwhile, 28.7% of them provided surgical placement and prosthesis restorations, 12.3% only surgical placement and 8.4% only prosthesis restoration in contrast with practice profile in Hongkong in 2008 (46) which up to half of the samples provided surgical placement and prosthesis restorations.

The majority of the participants perceived that dental implants would last for life, implying less awareness in post-treatment complications. Since dentists are patient's main source of information (53), the unrealistic perception of dentists may affect patient's understanding and expectation (9) In fact, the prevalence of dental implant pathologies increasingly found to be correlated with time in function (6, 26, 28). Furthermore, there is an evident that patient compliance in dental implant maintenance therapy was significantly associated with fewer conditions of peri-implantitis (54). As such, from patient-level perception, approximately 35.6% of them thought that dental implant last longer than natural teeth and revealed misinformed about dental implant complications. (55) From this point, it is important to revise consequences treatment after successful implant placement from dentists' perspective in order to avoid misleading perception of patients (49). Although, there was no significant association between factors and this attitude but agreement of the younger and less year of practice participants considered high among of all groups.

There were more participants who agreed that implant surgery should limited to only specialist (64.3%) especially younger participants. Furthermore, there was significant association of foundation implant knowledge learning by which who had never learnt about dental implant and who learnt from undergraduate curriculum had tendency to agree. However, in restoration phase, participants in this study considered it was more feasible treatment than surgical part. Regarding with number of patients that they had met significantly influences how general dentists involved in dental implant treatment. The participants who met 5-10 patients thought that

general dentists could involve in dental implant treatment both surgical and restorative part more than all other groups that might result from who provided less than 5 patients did not enough for them to confidently be a part of dental implant treatment but the more patients they have met, the more complications they would face resulted in lower of agreement. In contrary, about dental implant maintenance care there were smaller number of participants (22.4%) agreed with and up to 90.4% agreed that all dentists should be able to detect the sign of unhealthy implants. This suggested that most of the participants agreed that general dentists should take part in providing implant maintenance care even almost half of them would refer patients with dental implant for maintenance care with other dentists.

There was variation of responses in maintaining dental implant among general dental practitioners in this study with respect to attitudes, the participants tended to provide more treatment about dental implant such as comprehensive examination, maintenance care or treatment of dental implant problems presented high attitudes score meanwhile the participants who replied that they would refer examination and treatment about dental implant to other dentists presented lowest mean attitudes. The most frequent reasons for who did not provide maintenance care were apprehensive of their knowledge and training. (41.7%) Due to the fact that implant education they had learnt might not suit their daily practice as well as the UK and the North America survey mentioned that undergraduate education had failed to cover adequate implant training and needed improvement which not only dental implant comprehension but also capability in complication diagnosis and management (50, 52). Moreover, the variety of institution and education pathway are mass (1) as well as the absent of universal guidelines for implant maintenance may be another obstacle. Exploration and assessing the effective education method for dental implant maintenance care would benefit the sustainability of dental implant treatment. However, favourable practice setting and supply of equipment for dental implant maintenance should be reorganized.

Limitations of this study are the lack of diversity in participants' Main workplace, location of workplace and experience in dental practice which may affect their daily practice procedures. This study was the preliminary survey at the national

scale without referral tracking, thus the exact response rate cannot be computed. We expect that the questionnaires' link delivery method via closed line messenger group could preserved accessibility of only the socially active dentists. Considering the non-probability type sampling that might limited diversity of participants. Future research should improve strategies for enhancing diversity of the participants. Added to such, this study is based on quantitative approach which prevails somehow over superficial details from the participants, further investigation is needed to provide insight information. Indeed, there is still a lack of deep information about the practitioners' opinion about responsibility of multispecialty associate to dental implant post-treatment and follow-up care.

Chapter 6 Conclusion

The results of this exploratory study revealed that attitudes related to dental implant maintenance associated with knowledge about dental implant complication and responses in providing maintenance care whilst the general dental practitioners tended to provide further treatment correspond to their attitudes. However, the general dental practitioners who participated in this study still felt less confident to provide dental implant maintenance care and treatment of problems. The reported obstacles, perhaps, due to insufficient knowledge and inappropriate practice setting. Further studies might be beneficial to investigate the understanding in how general dental practitioners perceive dental implant maintenance care. Besides, the factors about effective learning methods in providing dental implant comprehensive examination and maintenance care in the dental implant curriculum could improve practitioners' certainty.

Time Schedule

Activities	Jan 18	Feb 18	Mar 18	Apr 18	May 18	Jun 18	Jul 18	Aug 19	Sep 18	Oct 18	Nov 18	Dec 18	Jan 19	Feb 19	Mar 19	Apr 19	May 19
Literature review and research proposal																	
Research ethics approval																	
Having the initial pool review by the experts																	
Administering the items to a development sample																	
Evaluating the items and optimizing scale length																	
Data collection																	
Data analysis																	
Writing thesis manuscript																	

REFERENCES

1. Koole S, Vandeweghe S, Mattheos N, Bruyn H. Implant dentistry education in Europe: 5 years after the Association for Dental Education in Europe consensus report. European Journal of Dental Education. 2014;18(s1):43-51.

2. Monje A, Aranda L, Diaz K, Alarcón M, Bagramian R, Wang H, et al. Impact of maintenance therapy for the prevention of peri-implant diseases: a systematic review and meta-analysis. Journal of dental research. 2016;95(4):372-9.

3. Hugoson A, Koch G, Göthberg C, Helkimo AN, Lundin S-A, Norderyd O, et al. Oral health of individuals aged 3-80 years in Jönköping, Sweden during 30 years (1973-2003). I. Review of findings on dental care habits and knowledge of oral health. Swedish dental journal. 2005;29(4):125-38.

4. research I. Global Dental Implant And Prosthetics Market Forecast 2017-2025 2017 [Available from: https://www.reportbuyer.com/product/5012007/global-dental-implant-and-prosthetics-market-forecast-2017-2025.html.

5. Karoussis IK, Brägger U, Salvi GE, Bürgin W, Lang NP. Effect of implant design on survival and success rates of titanium oral implants: a 10-year prospective cohort study of the ITI® Dental Implant System. Clinical Oral Implants Research. 2004;15(1):8-17.

6. Simonis P, Dufour T, Tenenbaum H. Long-term implant survival and success: a 10–16-year follow-up of non-submerged dental implants. Clinical oral implants research. 2010;21(7):772-7.

7. Gay I, Tran D, Weltman R, Parthasarathy K, Diaz-Rodriguez J, Walji M, et al. Role of supportive maintenance therapy on implant survival: a university-based 17 years retrospective analysis. International journal of dental hygiene. 2016;14(4):267-71.

8. Roos-Jansåker AM, Lindahl C, Renvert H, Renvert S. Nine-to fourteen-year follow-up of implant treatment. Part II: presence of peri-implant lesions. Journal of clinical periodontology. 2006;33(4):290-5.

9. Yao J, Li M, Tang H, Wang PL, Zhao YX, McGrath C, et al. What do patients expect from treatment with Dental Implants? Perceptions, expectations and misconceptions: a multicenter study. Clinical oral implants research. 2017;28(3):261-71.

10. Fardal Ø. Interviews and assessments of returning non-compliant periodontal maintenance patients. Journal of clinical periodontology. 2006;33(3):216-20.

11. Eickholz P, Kaltschmitt J, Berbig J, Reitmeir P, Pretzl B. Tooth loss after active periodontal therapy. 1: Patient-related factors for risk, prognosis, and quality of outcome. Journal of clinical periodontology. 2008;35(2):165-74.

12. Roccuzzo M, Bonino F, Aglietta M, Dalmasso P. Ten-year results of a three arms prospective cohort study on implants in periodontally compromised patients. Part 2: clinical results. Clinical Oral Implants Research. 2012;23(4):389-95.

13. Mattheos N, Collier S, Walmsley A. Specialists' management decisions and attitudes towards mucositis and peri-implantitis. British dental journal. 2012;212(1):E1-E.

14. Jhangiani R, Tarry H, Stangor C. Principles of Social Psychology-1st International Edition. Campus Manitoba; 2015.

15. Downing JW, Judd CM, Brauer M. Effects of repeated expressions on attitude extremity. Journal of Personality and Social Psychology. 1992;63(1):17.

16. Ferguson MJ, Bargh JA, Nayak DA. After-affects: How automatic evaluations influence the interpretation of subsequent, unrelated stimuli. Journal of Experimental Social Psychology. 2005;41(2):182-91.

17. Fazio RH. How do attitudes guide behavior. Handbook of motivation and cognition: Foundations of social behavior. 1986;1:204-43.

18. Glasman LR, Albarracín D. Forming attitudes that predict future behavior: a meta-analysis of the attitude-behavior relation. Psychological bulletin. 2006;132(5):778.

19. Boone HN, Boone DA. Analyzing likert data. Journal of extension. 2012;50(2):1-5.

20. Mendes WB. Assessing autonomic nervous system activity. Methods in social neuroscience. 2009:118-47.

21. Müller F, Naharro M, Carlsson GE. What are the prevalence and incidence of tooth loss in the adult and elderly population in Europe? Clinical oral implants research. 2007;18(s3):2-14.

22. Pjetursson BE, Thoma D, Jung R, Zwahlen M, Zembic A. A systematic review of the survival and complication rates of implant-supported fixed dental prostheses (FDPs) after a mean observation period of at least 5 years. Clinical oral implants

research. 2012;23(s6):22-38.

23. Albrektsson T, Zarb G, Worthington P, Eriksson A. The long-term efficacy of currently used dental implants: a review and proposed criteria of success. Int J Oral Maxillofac Implants. 1986;1(1):11-25.

24. Zembic A, Kim S, Zwahlen M, Kelly JR. Systematic review of the survival rate and incidence of biologic, technical, and esthetic complications of single implant abutments supporting fixed prostheses. International journal of oral & maxillofacial implants. 2014;29.

25. Heitz-Mayfield LJ, Lang NP. Comparative biology of chronic and aggressive periodontitis vs. peri-implantitis. Periodontology 2000. 2010;53(1):167-81.

26. Derks J, Tomasi C. Peri-implant health and disease. A systematic review of current epidemiology. Journal of clinical periodontology. 2015;42(S16).

27. Roos-Jansåker AM, Renvert H, Lindahl C, Renvert S. Nine-to fourteen-year follow-up of implant treatment. Part III: factors associated with peri-implant lesions. Journal of clinical periodontology. 2006;33(4):296-301.

28. Roos-Jansäker A, Lindahl C, Renvert H, Renvert S. Nine-to fourteen-year followup of implant treatment. Part I: implant loss and associations to various factors. Journal of Clinical Periodontology. 2006;33:283-9.

29. Salvi GE, Zitzmann NU. The effects of anti-infective preventive measures on the occurrence of biologic implant complications and implant loss: a systematic review. International journal of oral & maxillofacial implants. 2014;29.

30. Lindhe J, Meyle J, Group DoEWoP. Peri-implant diseases: Consensus Report of the Sixth European Workshop on Periodontology. J Clin Periodontol. 2008;35(8 Suppl):282-5.

31. Heitz-Mayfield LJ, Salvi GE, Botticelli D, Mombelli A, Faddy M, Lang NP. Anti-infective treatment of peri-implant mucositis: a randomised controlled clinical trial. Clinical oral implants research. 2011;22(3):237-41.

32. Ji YJ, Tang ZH, Wang R, Cao J, Cao CF, Jin LJ. Effect of glycine powder air-polishing as an adjunct in the treatment of peri-implant mucositis: a pilot clinical trial. Clinical oral implants research. 2014;25(6):683-9.

33. Siena F, Francetti L, Corbella S, Taschieri S, Fabbro M. Topical application of 1% chlorhexidine gel versus 0.2% mouthwash in the treatment of peri-implant mucositis. An observational study. International journal of dental hygiene. 2013;11(1):41-7.

34. Renvert S, Roos-Jansåker AM, Claffey N. Non-surgical treatment of peri-implant mucositis and peri-implantitis: a literature review. Journal of Clinical Periodontology. 2008;35(s8):305-15.

35. Salvi GE, Ramseier CA. Efficacy of patient-administered mechanical and/or chemical plaque control protocols in the management of peri-implant mucositis. A systematic review. Journal of clinical periodontology. 2015;42(S16).

36. Jepsen S, Berglundh T, Genco R, Aass AM, Demirel K, Derks J, et al. Primary prevention of peri-implantitis: Managing peri-implant mucositis. Journal of clinical periodontology. 2015;42(S16).

37. Figuero E, Graziani F, Sanz I, Herrera D, Sanz M. Management of peri-implant mucositis and peri-implantitis. Periodontology 2000. 2014;66(1):255-73.

38. Costa FO, Takenaka-Martinez S, Cota LOM, Ferreira SD, Silva GLM, Costa JE. Peri-implant disease in subjects with and without preventive maintenance: a 5-year follow-up. Journal of clinical periodontology. 2012;39(2):173-81.

39. Brägger U, Hirt-Steiner S, Schnell N, Schmidlin K, Salvi GE, Pjetursson B, et al. Complication and failure rates of fixed dental prostheses in patients treated for periodontal disease. Clinical Oral Implants Research. 2011;22(1):70-7.

40. E Jung R, Zembic A, Pjetursson BE, Zwahlen M, S Thoma D. Systematic review of the survival rate and the incidence of biological, technical, and aesthetic complications of single crowns on implants reported in longitudinal studies with a mean follow-up of 5 years. Clinical oral implants research. 2012;23(s6):2-21.

41. Mombelli A, Brägger U, Lang NP, Bürgin WB. Comparison of periodontal and peri-implant probing by depth-force pattern analysis. Clinical Oral Implants Research. 1997;8(6):448-54.

42. Mombelli A, Lang NP. Clinical parameters for the evaluation of dental implants. Periodontology 2000. 1994;4(1):81-6.

43. <The First Five Years a framework for undergraduate dental education.pdf>.

44. Blum IR, O'Sullivan DJ, Jagger DC. A survey of undergraduate education in dental implantology in UK dental schools. Eur J Dent Educ. 2008;12(4):204-7.

45. Yamane T. Statistics: An introductory analysis. 1973.

46. Ng PC-H, Pow EH-N, Ching S-H, Lo EC-M, Chow T-W. Dental implant practice among Hong Kong general dental practitioners in 2004 and 2008. Implant dentistry. 2011;20(1):95-105.

47. Mattheos N, Collier S, Walmsley A. Specialists' management decisions and attitudes towards mucositis and peri-implantitis. British dental journal. 2012;212(1):E1.

48. Lang-Hua BH, Lang NP, Lo EC, McGrath CP. Attitudes of general dental practitioners towards implant dentistry in an environment with widespread provision of implant therapy. Clinical oral implants research. 2013;24(3):278-84.

49. Insua A, Monje A, Wang HL, Inglehart M. Patient-Centered Perspectives and Understanding of Peri-Implantitis. Journal of periodontology. 2017;88(11):1153-62.

50. Jayachandran S, Bhandal B, Hill K, Walmsley A. Maintaining dental implants–do general dental practitioners have the necessary knowledge? British dental journal. 2015;219(1):25.

51. Esfandiari S, Majdzadeh R, Feine J. Types of Canadian dentists who are more likely to provide dental implant treatment. Implant dentistry. 2011;20(1):76-84.

52. Kihara H, Sun J, Sakai M, Nagai S, Da Silva J. A Survey of Dental Implant Instruction in Predoctoral Dental Curricula in North America. Journal of dental education. 2017;81(9):1085-90.

53. Pommer B, Zechner W, Watzak G, Ulm C, Watzek G, Tepper G. Progress and trends in patients' mindset on dental implants. I: level of information, sources of information and need for patient information. Clinical oral implants research. 2011;22(2):223-9.

54. Monje A, Wang HL, Nart J. Association of preventive maintenance therapy compliance and peri-implant diseases: a cross-sectional study. Journal of periodontology. 2017;88(10):1030-41.

55. Vipattanaporn P, Mattheos N, Pisarnturakit P, Pimkhaokham A, Subbalekha K. Post-treatment patient reported outcome measures in a group of thai dental implant

patients. Clinical oral implants research. 2019.

VITA

NAME	Aimwalee Rudeejaraswan
DATE OF BIRTH	25 August 1988
PLACE OF BIRTH	Bangkok
INSTITUTIONS ATTENDED	Faculty of dentistry, Chulalongkorn university
HOME ADDRESS	631 Seewalee 2 Rangsit-Nakornnayok Pachathipat, Thunyaburee Pathumthani
PUBLICATION	-
AWARD RECEIVED	-