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Bridging dentistry and traditional Chinese medicine: a study on the current mutual understanding among the future practitioners
Community Health Project 2014/15

Bridging dentistry and traditional Chinese medicine: 

a study on the current mutual understanding among the 

future practitioners

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1. Abstract

Objectives: This project aimed to promote the mutual understanding between dental and TCM students. The objectives were to describe the current teaching of dentistry in the TCM schools and that of TCM in the dental school, to describe the TCM students’ knowledge on dentistry and the dental students’ knowledge on TCM, and to produce promotional materials for enhancing the mutual understanding between dental and TCM students.

Methods: Information on the current teaching of dentistry in the TCM schools and that of TCM in the dental school was collected through a search on the undergraduate programme syllabus and conducting interviews with the leaders of the schools. Questionnaire surveys were conducted among the final year students of the TCM and the dental schools to collect information on their knowledge of the counter profession. Two leaflets and a short video were produced with the aid of computer software and used in the promotional activities.

Results: It was found that very little information on dentistry was covered in the undergraduate programmes of the three TCM schools, and vice versa in the dental school. A total of 39 TCM students and 55 dental students completed the questionnaire survey. Most of the students did not know the basic theories and practice of the counter profession. Less than half of the student knew what types of patient cases may be suitable for cross-referral to the other profession.

Conclusions: The TCM and dental schools in Hong Kong do not have scheduled teaching on the counter profession. The TCM students have little knowledge on dentistry and how to collaborate with dental practitioners on patients presented with oral problems. Conversely, it is the same for the dental students. Lastly, informative printed and audio-visual promotional materials can be produced with limited resources and used to facilitate the mutual understanding between TCM and dental practitioners.
2. Introduction

Hong Kong is a multicultural society, encompassing contemporary medical beliefs as seen in the practice of dentistry and traditional medical health beliefs as seen in the practice of traditional Chinese medicine (TCM). When seeking professional treatment for their dental problems, people in Hong Kong enjoy the option of choosing between TCM and dental practitioners. Yet, mutual understanding between these two types of health care professionals in Hong Kong is limited. The major barrier for collaboration between the TCM practitioners and dentists is not the language, but the basic concepts in diagnosis and management of oral diseases and problems. Increased mutual understanding can promote effective communication between the two professions and lead to increased collaboration. More alternative oral health care and treatment plans may be generated to serve the interests of the patients.

TCM is an ancient health practice developed in China dating back more than 2,000 years. The underlying therapeutic philosophies involve the principles of Ying and Yang, and the Five Elements (Gold, Wood, Water, Fire and Earth). About two decades ago, TCM education was introduced into the formal tertiary education system in Hong Kong and now undergraduate degree programmes in TCM are offered by the University of Hong Kong (HKU), the Chinese University of Hong Kong (CUHK) and the Hong Kong Baptist University (HKBU). The three universities together turn out over 70 graduates annually, adding to the 7,000 registered TCM practitioners in Hong Kong. The growth of TCM in Hong Kong is undoubtedly rapid, stemming to the definite trend and demand for TCM services among the Hong Kong people.

TCM emphasises on individualised and holistic treatments whereas in dentistry, like other branches of western medicine, most of the treatments target at specific causative agents of the diseases. There are limitations in the approach adopted in dentistry. Sometimes, the aetiology
of an oral disease is not yet fully understood, e.g. oral lichen planus, and thus only treatments for relief of symptoms can be offered. On the other hand, studies have shown that Chinese medicine can effectively treat some oral diseases, such as recurrent aphthous ulcers, oral lichen planus, leukoplakia, and Sjögren’s syndrome. There is great potential for the use of TCM remedies to complement those currently used in dentistry for treating oral health problems. The idea of amalgamation of the two contrasting philosophies is an intriguing notion. Receiving complementary care from both TCM and dental practitioners can be valuable to patients in enhancing their oral and general health.

The decision between receiving treatment from TCM or dental practitioners underscores various treatment seeking behaviours. Choosing TCM rather than dentistry may highlight that TCM is considered as culturally appropriate, holistic, convenient, and cost effective by the users and people who fear going to the dentist. Many conservative-minded Chinese people consider Western medicine aggressive and in some instances used too extensively. On the contrary, selective patients may opt for treatment from a dentist, who consider TCM as lacking scientific explanation. In a survey of a sample of 500 Hong Kong adults using telephone interview, most of the interviewees (89%) expressed an interest in TCM approaches to managing oral health and over half of them (54%) were interested in receiving such type of care from their dentist. The study further reveals that among those who had used TCM in the past to manage their oral health, over half (56%) used it in conjunction with western dentistry.

In 2008, the World Health Organization advocated that the communication between conventional and traditional medical care providers should be strengthened and that appropriate training programmes be established for health professionals, medical students and relevant researchers.
In this community health project, we aspired to take a step closer to the betterment of communication between the two professions, namely TCM and dentistry, by first investigating the current teaching at the TCM schools and the dental school in Hong Kong. Students are viewed as prospective practitioners in the near future, and their knowledge ultimately reflects the thoughts of the next generation. In essence, with more insight into the knowledge of both dental and TCM students, better communication and thereby potential collaboration can be promoted.
3.  **Aim and Objectives**

   The aim of this community health project was to promote the mutual understanding between dental and TCM students.

   The objectives of this study were:

1. to describe the current teaching of dentistry in the TCM schools,
2. to describe the current teaching of TCM in the dental school,
3. to describe the TCM students’ knowledge on dentistry,
4. to describe the dental students’ knowledge on TCM, and
5. to produce promotional materials for enhancing the mutual understanding between dental and TCM students.
4. Materials and Methods

4.1. Search for information on oral diseases and treatments in TCM

To have a preliminary insight into the basic principles of TCM, and how oral diseases are diagnosed and treated, four recommended textbooks and reference books for TCM students were studied.13-16

4.2. Search for information on current teaching of dentistry in TCM schools

The heads of the three university-based TCM schools, namely those in CUHK, HKU and HKBU, were contacted via e-mails. Arrangements were made to conduct face-to-face interviews with the head or undergraduate programme director of the TCM schools. Finally, interviews with the following persons were conducted in late 2014 and early 2015:

1) Professor Leung Wing Nang Albert, director of the School of Chinese Medicine at CUHK,
2) Professor Lao Li Xing, director of the School of Chinese Medicine at HKU, and
3) Professor Li Min, programme director of BCM&BSc (Bachelor of Chinese Medicine and Bachelor of Science in Biomedical Science) of the School of Chinese Medicine at HKBU.

A set of questions was sent to the interviewees before the interview (Appendix 1). Questions were on the curriculum of the undergraduate TCM program, how TCM explains and manages oral problems, how TCM views treatments offered in dentistry, and when to refer patients among TCM and dental practitioners. Each interview each last for 15 to 60 minutes.

Besides conducting interviews, to find out more about the contents of the TCM undergraduate programme, the syllabus of the programmes shown in the websites of the three TCM schools were searched.3-5
4.3. Survey of TCM students

The target group of this survey was the final year undergraduate TCM students. The survey was conducted using an anonymous questionnaire designed for self-completion (Appendix 2). There were a total of ten questions for assessing the TCM students’ knowledge of the theories taught and treatments used in dentistry, and the potential collaboration between TCM and dental practitioners in management of oral health problems.

The questionnaires were distributed to the TCM students and collected immediately after completion by our group of students in two TCM schools, the one at CUHK and the one at HKU. The students’ answers to the questions were coded and the coding was cross-checked before the data were input into a computer. The data were proof-read before analysis. The statistical software SPSS for Windows was used to produce the descriptive tables.

4.4. Search for information on current teaching of TCM in dental school

A face-to-face interview with the Associate Dean for undergraduate teaching of the dental school at HKU, Professor Gary S.P. Cheung, was conducted in early 2015. The interview, lasting for approximately 15 minutes, was based on a set of questions sent to the interviewee prior to the interview (Appendix 3). The objective of this interview was to find out the planned teaching of TCM in the undergraduate dental curriculum.

To supplement the information collected in the interview, a search of the dental undergraduate programme syllabus as well as the suggested reference readings was conducted.
4.5. Survey of dental students

The target group of this survey was the final year undergraduate dental students. An anonymous questionnaire designed for self-completion was used (Appendix IV). There were ten questions in the questionnaire for assessing the dental students’ knowledge of the theories taught in TCM, and the potential collaboration between TCM and dental practitioners in management of oral health problems.

The questionnaires were distributed to the dental students and collected immediately after completion by our group of students. The students’ answers to the questions were coded and the coding was cross-checked before the data were input into a computer. The data were proof-read before analysis. The statistical software SPSS for Windows was used to produce the descriptive tables.

4.6. Production of promotional materials for dental and TCM students

The promotional materials for enhancing the mutual understanding between dental and TCM students consisted of two leaflets, one for dental students and another one for TCM students, and a video. The video was shown to the TCM and the dental students after they had completed the questionnaire. The corresponding leaflet was distributed to each student participant afterward watch the video.

(i) Leaflets

Two versions of leaflet with colour illustrations were produced in this project. The leaflets were in English and specific professional terms were complemented with Chinese translation. The content and the layout of the two leaflets were devised by members of our student group.
Computer software including Adobe Photoshop CC and Microsoft Publisher was used in the production of these leaflets.

(ii) Video

A six-minute video was enacted, targeting both the dental and the TCM students. A script on two cases were written by our student group. The first case was about a female patient with bad breath and gum bleeding seeking treatment from a TCM practitioner and the second case was a male patient with recurrent oral ulcers seeking treatment from a dentist. The actors in the video were members of our student group. The video was produced with a Cantonese soundtrack and was embedded with Chinese and English subtitles. The entire span of the video was edited using the computer software Adobe Premiere Pro CS6.
5. Results

5.1. Theories on oral diseases and treatments in TCM

The following information on the basic TCM theories and management of oral diseases were extracted from the four recommended textbooks and reference books for TCM students which we had studied in this project.

Yin and Yang Theory (陰陽學說)

Yin and Yang are opposite qualities. Yin refers to qualities such as cold, inactivity, interior and darkness. Yang indicates heat, movement, exterior and lightness. Yin and Yang always coexist and their equilibrium ensures the normal physiological state of life.

The Five Zang and Six Fu Organs (五臟六腑)

The five Zang and six Fu organs are vital visceral organs. The five Zang organs are the liver (肝), heart (心), spleen (脾), lungs (肺) and kidney (腎). The six Fu organs are the gall bladder (膽), small intestine (小腸), stomach (胃), large intestine (大腸), bladder (膀胱) and sanjiao (三焦).

The Zang organs that are associated with the oral cavity include the liver, heart, spleen and kidney. The Fu organs related to the oral cavity include the stomach, small intestine and bladder.

Theory of the Five Elements (五行學說)

In TCM, wood, fire, earth, metal and water are the five basic elements of nature. They coexist in two cycles: one for engendering (生) and the other for control (剋) (Fig. 1). Without engenderment, life will not exist. Without control, the elements will become excessive. Each
of the five elements correlates to a Zang and a Fu organ (Fig. 2). Therefore, an imbalance of one element will lead to an imbalance of another element as well as their related Zang and Fu organs.

Fig. 1. The engendering and control cycles of the five elements.

<table>
<thead>
<tr>
<th>Five elements</th>
<th>Wood</th>
<th>Fire</th>
<th>Earth</th>
<th>Metal</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zang organs</td>
<td>Liver</td>
<td>Heart</td>
<td>Spleen</td>
<td>Lung</td>
<td>Kidney</td>
</tr>
<tr>
<td>Fu organs</td>
<td>Gall bladder</td>
<td>Small intestine</td>
<td>Stomach</td>
<td>Large intestine</td>
<td>Bladder</td>
</tr>
</tbody>
</table>

**Periodontal diseases**

According to TCM, there are three main etiological patterns for periodontal diseases. These are: (1) stomach and intestine fire and heat pattern (胃火上蒸), (2) kidney Yin deficiency pattern (腎陰虧損); and (3) deficiency of Qi and blood (氣血不足). The treatment regimens are divided into internal and external approaches.
(i) **Internal treatment regimens**

The choice of internal treatment is based on the etiological pattern of the diseases and is shown in the table below.

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Treatment principle</th>
<th>Example of herbal medicine</th>
</tr>
</thead>
</table>
| Stomach and intestine fire and heat | • Clear the stomach and drain fire  
• Reduce pain and swelling             | Qing Wei San (清胃散)             |
| Kidney Yin deficiency          | • Nourish Yin  
• Strengthen bones and teeth                      | Liu Wei Di Huang Wan Tang (六味地黃湯) |
| Deficiency of Qi and blood     | • Replenish Qi and blood  
• Strengthen gums and teeth                        | Ba Zhen Tang (八珍湯)             |

(ii) **External treatment regimens**

The external treatments are similar for periodontal diseases with different etiological pattern. The main external treatment regimens are:

1) use of saline and herbal medicine mouth rinses,
2) removal of dental calculus, and
3) extraction of teeth (indicated when more than 2/3 of the root is exposed).

(iii) **Prevention**

Preventive measures for periodontal diseases in TCM are as follows:

1) keep good oral hygiene,
2) reduce intake of spicy food, and
3) gum massage to increase blood supply.
Toothache

According to TCM, the four main etiological patterns for toothache are: (1) wind-fire toothache (風熱牙痛), (2) stomach-fire toothache (胃火牙痛); (3) asthenic-fire toothache (虛火牙痛); and (4) toothache caused by caries (齲齒牙痛). The treatment regimens can be divided into internal and external approaches.

(i) Internal treatment regimens

The choice of internal treatment is based on the etiological pattern of the toothache and is shown in the table below.

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Treatment principle</th>
<th>Example of herbal medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>wind-fire toothache</td>
<td>• Clear wind-fire evil</td>
<td>Bo He Lian Qiao Fang (薄荷連翹方)</td>
</tr>
<tr>
<td></td>
<td>• Detoxification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Relieve swelling</td>
<td></td>
</tr>
<tr>
<td>stomach-fire toothache</td>
<td>• Clear the stomach and drain fire</td>
<td>Qing Wei San (清胃散)</td>
</tr>
<tr>
<td></td>
<td>• Reduce pain and swelling</td>
<td></td>
</tr>
<tr>
<td>asthenic-fire toothache</td>
<td>• Nourish yin</td>
<td>Zhi Bai Ba Wei Wan (知柏八味丸)</td>
</tr>
<tr>
<td></td>
<td>• Strengthen the kidney</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Diminish the fire evil</td>
<td></td>
</tr>
<tr>
<td>toothache caused by caries</td>
<td>• Clear stomach fire</td>
<td>Qing Wei Tang (清胃湯)</td>
</tr>
<tr>
<td></td>
<td>• Reduce pain and swelling</td>
<td></td>
</tr>
</tbody>
</table>

(ii) External treatment regimens

Despite possible differences in the etiological pattern, the external treatments for toothache are the same. They are:
1) use of saline mouth rinses,
2) tooth brushing at areas in pain, and
3) topical application of herbs.
5.2. Current teaching of dentistry in the TCM schools

From the search on the syllabus of TCM undergraduate programme in the three TCM schools, it was found that the teaching mainly covered TCM theories, integration of TCM with general medical sciences, and the practice of TCM. Very little information on dentistry was covered in the TCM programmes.

The main information collected in the three interviews with the head or undergraduate programme director of the three TCM schools is summarized in the following paragraphs.

1) All three TCM schools cover general western medicine in their undergraduate curriculum, comprising western biomedical sciences and general medicine concepts. However, due to the lack of time, there is no provision of knowledge specifically on dentistry. With regard to possible inclusion of dental knowledge into the curriculum, the TCM schools held divergent views. While HKBU would refrain from including dental knowledge into its TCM curriculum, HKU claimed that incorporation of lectures on dentistry would be possible provided that a prior assessment on how much TCM students should learn about dentistry is carried out.

2) With regard to the etiology of oral diseases, all three TCM schools teach their students the relationships between “excessive heat” and oral problems. Heat is a kind of evil inside the human body which can cause oral problems like halitosis and red tongue. Hence, it is necessary to restore the balance between heat and cold in the body.

3) For the management of oral problems in TCM, numerous TCM theories were mentioned in the interviews. For instance, a holistic management approach drawing on the balance of Yin and Yang was suggested. Furthermore, the potential use of acupuncture as analgesia was mentioned in the management of dental and temporo-mandibular joint pain.

4) Concerning dentists’ common treatments for oral problems (such as scaling, dental fillings,
and tooth extraction), all three interviewees agreed that dental treatments could help to solve the patients’ acute symptoms.

5) The three TCM experts suggested numerous situations in which dentists should refer patients to a TCM practitioner for collaborative treatment, including bad breath (halitosis), recurrent oral ulcers, TMJ problem, and poor general health.

6) The interviewees from HKU and HKBU mentioned that the referral from TCM practitioners to dentists would be appropriate for patients suffering from toothache, established dental caries or TMJ problems. The interviewee from CUHK suggested that the dental profession could provide patient referral guidelines to TCM practitioners.

5.3. Survey of TCM students

In this survey, a total of 39 TCM students were approached and all of them completed the questionnaire. Among these respondents, 17 were year 4 students of HKU and 22 were year 3 students of CUHK.

Regarding their knowledge on dentistry, most of the TCM students could indicate that fluoride varnish (87.2%) and oral hygiene instructions (94.9%) are preventive dental treatments (Fig 2). However, 74.4% of the respondents did not choose fissure sealant and 30.8% incorrectly chose dental filling as a preventive treatment.
Fig. 2. Responses of the TCM students to the question “Which of the dental treatments is/are regarded as preventive treatment?”.

Fig. 3. Responses of the TCM students to the question “According to western dentistry, what is the main cause of periodontal disease?”.
Most (97.4%) of the respondents correctly indicated that dental plaque is the main cause of periodontal disease (Fig. 3). As for dental caries, two thirds of them indicated that dental plaque is an etiological factor (Fig. 4). However, most (82.7%) of them regarded dental erosion and about half (46.2%) regarded tooth worm as the etiology, which indicates a misconception.

Fig. 4. Responses of the TCM students to the question “According to western dentistry, which are etiological factors of tooth decay?”.

Fig. 5. Responses of the TCM students to the question “According to western dentistry, what are the possible causes of toothache?”.
The TCM students had good knowledge on the possible causes of toothache as almost all (97.4%) of them knew that tooth decay is a possible cause while 82.1% knew that dental trauma is another (Fig. 5).

Majority of the respondents recognized fillings (92.3%) and root canal treatments (66.7%) as treatment modalities for dental caries (Fig.6). In spite of this, one third of the respondents incorrectly indicated scaling as a treatment for dental caries.

Fig. 6. Responses of the TCM students to the question “Which is/are treatments that a dentist may use for treating tooth decay?”.
Tooth wear (82.7%), tooth loss (82.7%), and tooth mobility (79.5%) were indicated by most of the respondents as a natural dental phenomenon of aging (Fig.7).

For the application of acupuncture in dentistry, most (79.5%) of the respondents answered post-operative analgesics and treatment of Bell’s palsy (Fig.8). About half (51.3%) of them also suggested its use for intra-operative anesthesia, anxiety control and gag reflex control.
Fig. 9. Responses of the TCM students to the question “Which of the followings is/are application of herbal medicine in dentistry?”.  

Fig. 10. Responses of the TCM students to the question “Under what situation should TCM practitioners advise their patients to visit a dentist for treatment?”.  

Fig. 11. Responses of the TCM students to the question “Under what situation should dentists advise their patients to visit a TCM practitioner for treatment?”.

Regarding the use of herbal medicine, nearly all (92.3%) of the respondents related it to treatment of oral ulcers and xerostomia while slightly less than three quarters (71.8%) indicated its use to treat periodontal diseases (Fig.9).

About half (53.8%) of respondents thought that TCM practitioners should advise their patients to visit a dentist for local dental problems (Fig.10). Only about a quarter (25.6%) of them suggested that a dentist should advise their patients to visit a TCM practitioner for treatment of internal factor health problems (Fig.11).
5.4. Current teaching of TCM in the dental school

In the search on the syllabus of dental undergraduate programme and the curriculum, no reference to TCM was found in the learning objectives. There were also no suggested readings on TCM.

The main information collected in the interview with the Associate Dean for undergraduate teaching of the Faculty of Dentistry, HKU is summarized below.

1) The undergraduate teaching in the dental school does not cover TCM. There is no plan to include TCM into the current dental curriculum. Collaboration between TCM and dentistry is possible but is currently confined to research.

2) In clinical practice, the interviewee thought that collaboration between TCM practitioners and dentists would be limited to a few aspects such as treatment of periodontal diseases, mucosal diseases, cancer and autoimmune diseases. He would not recommend the use of acupuncture for achieving satisfactory anesthesia but its use as an adjunct with western anesthetic agent is possible. Oral ulcers could be treated with mutual efforts by both professions since the etiology of oral ulcers is not clearly known in dentistry.

3) Concerning whether dentists should refer patients to TCM practitioners for collaborative care, it was suggested that dentists could refer patients with conditions such as cancer or autoimmune diseases.

4) The interviewee thought that TCM practitioners should refer patients to dentists for care when there are signs and symptoms of dental infection, such as swelling, fever and pain.
5.5. Survey of dental students

In this survey, 55 final year dental students were approached and a 100% response rate was obtained.

Regarding their knowledge of TCM theories, over 90% of the dental students correctly indicated that the spleen and the liver are Zang (Fig. 12). However, 29.1% of their answers wrongly included the pancreas.

About half (52.7%) of the respondents knew that in TCM the liver is related to tissues in the oral cavity and less than one third of the respondent knew about the other correct answers which are spleen, kidney and heart (Fig. 13).

Fig. 12. Responses of the dental students to the question “Which is/are included in the five Zang organs in TCM?”.
Fig. 13. Responses of the dental students to the question “According to TCM, which of the Zang organ(s) is/are associated with the tissues in the oral cavity?”.

Fig. 14. Responses of the dental students to the question “Which is/are included in the six Fu organs in TCM?”.
While around three quarters of the respondents knew that the gall bladder and stomach are Fu organs in TCM, over half (58.2%) of them wrongly regarded pancreas as a Fu organ (Fig. 14).

As for their knowledge on the relationship between different Fu organs and the oral cavity, 40% of the respondents knew about stomach but less than 5% of them knew about the urinary bladder and the small intestine (Fig. 15).

When asked which are the possible causes of toothache in TCM, close to two thirds (63.5%) of the dental students mentioned asthenic fire but less than a third of them could mention the other TCM explanations (Fig. 16).
Fig. 16. Responses of the dental students to the question “According to TCM, what is/are related to toothache?”.

Fig. 17. Responses of the dental students to the question “According to TCM, white patches on the anterior region of the tongue reflect underlying problems of which Zang organ(s)?”.

Fig. 18. Responses of the dental students to the question “According to TCM, white patches on the lateral region of the tongue reflect underlying problems of which Zang organ(s)?”.

Fig. 19. Responses of the dental students to the question “According to TCM, white patches on the central region of the tongue reflect underlying problems of which Zang organ(s)?”.
Fig. 20. Responses of the dental students to the question “According to TCM, white patches on the posterior region of the tongue reflect underlying problems of which Zang organ(s)?”.

Regarding the respondents’ knowledge on the mapping of white patches in different regions of the tongue to the different Zang organs, less than 10% of them knew the correct answers, which are heart to the anterior part of the tongue (Fig. 17), liver to the lateral parts (Fig. 18), spleen to the centre (Fig. 19), and kidney to the posterior region (Fig. 20).
Fig. 21. Responses of the dental students to the question “Which is/are the application(s) of acupuncture in dentistry?”.

Fig. 22. Responses of the dental students to the question “Which is/are the application(s) of herbal medicine in dentistry?”.
Most (85.5%) of the dental students suggested the use of acupuncture in dentistry for anxiety control (Fig. 21). Around two thirds of the respondents indicated its use for intra-operative anesthesia, treatment for Bell’s palsy and post-operative analgesics. Close to half (45.5%) also thought acupuncture could control gag reflex.

Almost all (94.5%) of the dental students recognized the application of herbal medicine in treating oral ulcers (Fig. 22). Around two thirds of the respondents also suggested the use of herbal medicine as a treatment for periodontal disease and xerostomia.

As shown in Fig. 23, less than half of the dental students thought TCM practitioners should refer patients to dentists when there are local dental problems (45.5%) and for all oral problems (36.4%). Only one quarter (23.6%) of them suggested TCM practitioners to refer their patients when there are local periodontal problems.

When asked under what situation dentists should advise their patients to visit a TCM practitioner, 29.1% of the dental student mentioned treatment of internal body factors (Fig. 24). Other reasons for referral, such as failure in dental treatment, halitosis, oral ulcers and periodontal diseases, were mentioned by 10% or less of the respondents.
Fig. 23. Responses of the dental students to the question “Under what situation should TCM practitioners advise their patients to visit a dentist for treatment?".

Fig. 24. Responses of the dental students to the question “Under what situation should dentists advise their patients to visit a TCM practitioner for treatment?".
5.6. Promotional materials for dental and TCM students

(i) Leaflets

Both the dental student and the TCM student versions of the leaflet contained brief descriptions on the therapeutic philosophies and management approaches adopted by dentists and TCM practitioners. Specific oral conditions that may potentially benefit from the collaborative care by both professions were outlined.

The leaflet for TCM students (Appendix 5) focused on providing information on basic dental knowledge and approaches used by dentists for treating common oral health problems such as periodontal diseases, halitosis and oral ulcer. It also included references for further information on dentistry. A total of 100 leaflets were printed. Besides distributing to the TCM students after the questionnaire survey, some copies of the leaflet were placed at the office of the TCM schools for interested staff and students to read.

The leaflet for dental students (Appendix 6) focused on providing information on basic TCM knowledge and the approaches used in TCM for treating common oral health problems. References for further information on TCM were provided. Sixty leaflets were printed. These were distributed to the final year dental students and some copies were placed at the office of the dental school.

(ii) Video

The promotional video (Appendix 7) consisted of an introduction and two oral disease cases showing the beneficial effects of collaborative care by dentists and TCM practitioners on treating periodontal diseases and oral ulcers. Besides showing to the survey participants, the video was later uploaded to YouTube and is available to all people, including dental and TCM students and practitioners, for viewing.
6. Discussions

6.1. Discussions on materials and methods used

6.1.1. Target group

Final year students in the TCM and dental schools were selected as the survey participants in this project since they would have obtained almost all the fundamental knowledge on their respective profession. The students are the future practitioners, and hence, promoting mutual understanding of the TCM and dental professions among the students may bring about a huge leap towards possible future collaboration.

6.1.2. Interview with the head or undergraduate programme director of the TCM schools

In this project, the head or undergraduate programme director of the TCM schools were chosen for the interview rather than senior TCM practitioners in private practice. This is because besides being an experienced TCM practitioner, the interviewees are responsible for the design and implementation of the TCM curriculum in their schools. Their thoughts and attitudes can influence the future TCM practitioners in Hong Kong. Practically, they should be more positive towards participation in our project and easier to approach for an interview.

Structured interview with pre-set open-ended questions was used in this project to collect the needed information from the representatives of the three TCM schools. This approach, instead of sending out questionnaire, is preferred because follow-up questions can be asked in the interview, if needed, for clarification or further information. To facilitate the interview, the planned questions were sent to the interviewees prior to the interview so that they could prepare comprehensive answers. It is noted that conducting interviews are more time-consuming for us, compared to other data collection methods such as send out questionnaires, but we appreciate this learning opportunity and the experience gained.
6.1.3. Survey of students

In the structured questionnaires used in the survey of TCM and dental and students, there were both multiple-choice and open-ended questions. Since a main objective of the survey was to assess the knowledge of the students, there were correct and wrong answers in the multiple-choice questions so that we can find out how much the students knew about the topic and also whether they had misconceptions. Meanwhile, open-ended questions were used to collect information on the students’ opinions and suggestions so that they could freely express their views and were not restricted by a framework.

Using self-completion questionnaire is a more efficient and less resource-consuming data collection method than conducting individual interviews. In view of the tight timetable of the final year TCM and dental students, the questionnaire used in this survey only required around 10 minutes to complete. This is an appropriate option and contributes to the 100% response rate obtained in the surveys. Most of the questions used in this survey are closed-ended questions and they are less time-consuming to answer and the collected information is easier to be analyzed.

Despite the above-mentioned advantages of using questionnaire, there are also limitations. An obvious one is that setting follow-up questions for clarification of the answers is very difficult, if not impossible, in a written questionnaire. Furthermore, in answering a multiple-choice question, a respondent may have selected a correct answer by chance without really knowing the facts. When a question is unanswered, i.e. left blank, it would difficult to judge whether the respondent does not know the answer or just has no time to write.
Due to limitation of time and resources in this project, pilot testing of the questionnaires was not performed. If we had more time, we would have pilot tested draft versions of the questionnaires among the students in the junior years so as to find out if there was any ambiguity in the questions and answer options. Furthermore, the survey sample size is relatively small and one of the TCM schools was not covered. Precautions in interpreting the results should be taken.

6.1.4. Promotional materials

Leaflets and a video were produced for use in the activities for promoting mutual understanding between the TCM and dental students. The use of leaflets was opted because they are concise and informative. Readers can acquire brief and yet clear messages which can help raising their awareness on the issue. Meanwhile, leaflets can be easily kept by the recipients and referred to in the future.

In addition to printed material, a video was produced in this project as another means to raise the students’ interest and awareness. Videos are fascinating and multi-media, displaying animation, audio and text at the same time. Additionally, videos offer convenience and can be accessed through electronic devices when and where it is convenient for the viewer, especially when it is uploaded to the internet.

The initial feedback we obtained from the TCM and dental students after they watched the video and received the leaflets was positive. However, proper evaluation was not executed in this project due to time and resources constraints. Despite the positive feedback, these promotional materials are not without flaws. With more resources, the quality of the promotional materials can be improved. Nevertheless, the leaflets and the video we produced
form good basis for developing high quality promotional materials later. With some modifications, these materials can be easily enriched for more general use. For instance, by including more detailed information in the content of the leaflets, alternative versions of leaflets can be produced to focus on specific kinds of oral diseases. This may be regarded as a milestone in the promotion of mutual understanding between the TCM and the dental practitioners in Hong Kong.

6.2. Discussions on results

6.2.1. Theories on oral diseases and treatments in TCM

TCM uses both internal and external treatment regimens to treat oral diseases. In the internal treatment regimens, TCM treats the oral diseases according to the internal etiologies defined in its theories, aiming to restore the internal balances within the body. The external treatment regimens, including removal of dental calculus and tooth extractions, are similar to the treatments carried out by dentists. To a certain extent, TCM theories support modern dental treatments. Nonetheless, TCM treats oral diseases in a more holistic manner rather than focusing on local causative factors.

In general, there are no conflicts between the treatment methods adopted by dentists and TCM practitioners. In fact, both professions share some similar treatment modalities and their treatments may be complementary to those of the other profession. There is a foundation for development of good collaboration between TCM and dental practitioners in treating oral health problems.
6.2.2. Current teaching of dentistry in the TCM schools

There is no structured teaching of dentistry in all three TCM schools. In the interviews with the leaders of the TCM schools, it was found that two of the TCM schools were interested in introducing knowledge on dentistry to their students but they can only spend limited time on this in their undergraduate curriculum. Concerns were raised in terms of the availability of resources needed, such as suitable dental teachers, to execute the plan. In response to this, teachers in the dental school may consider offering some relevant workshops for TCM students to improve their awareness and knowledge of dentistry.

6.2.3. Survey of TCM students

Results of the questionnaire survey on TCM students show that they do not have good dental knowledge. For example, most of the respondents of the survey could not relate tooth mobility to periodontal diseases and they thought tooth loss is a natural phenomenon of ageing instead of a pathological process. It seems that the TCM students do not have sufficient knowledge to recognize the presence of periodontal disease and acknowledge the need to refer their patients to a dentist for collaborative treatment. Most of the TCM students do not know what types of patient cases are appropriate for cross-referral between TCM and dental practitioners. This may be due to their insufficient clinical experience and lack of understanding of the dental profession. To address this issue, seminars or talks should be organized to provide the TCM students with the relevant information.

In the survey, most of the respondents thought that herbal medicine can be used to treat disorders of the oral soft tissues. It seems that at present herbal medicine has a greater potential than acupuncture as a complementary treatment to those used by dentists in treating the oral soft tissue diseases such as periodontal diseases and ulcers. Dentists can consider of managing
a patient with these oral health problems jointly with TCM practitioners, in particular by providing herbal medicine.

6.2.4. Current teaching of TCM in the dental school

Most dental schools worldwide do not teach TCM in their undergraduate curriculum. Neither does the dental school in Hong Kong. However, findings of a local study show that there is a demand for using TCM to treat oral health problems among the Hong Kong people. Moreover, TCM is a well-established health profession in Hong Kong and TCM concepts are well spread among the population. It would be of great benefit to the dental students to know more about TCM and its use in treating oral diseases. Teachers from the TCM schools, especially the one at HKU, can be invited to provide learning opportunities for the dental students for enhancement of the dental undergraduate curriculum.

6.2.5. Survey of dental students

From the findings of the survey on the final year dental students, it is apparent that the students have poor knowledge on the basic TCM concepts and TCM theories on pathologies with respect to the oral cavity. This will affect their ability to communicate, interact and collaborate with TCM practitioners. It is good to see that, like the TCM students, most of the dental students recognize the potential use of herbal medicine in treating oral soft tissue problems. This is probably a good starting point for the two profession to develop collaborative care for patients with oral health problems.

This survey found that most of the respondent did not think that TCM practitioners should advise patients with oral health problems to seek care from dentists. They also did not know when to advise their patients to consult a TCM practitioner. This will likely hamper future cross referral of suitable patient cases between the two professions.
7. Conclusions

Based on the findings of this project and within limitations, the following conclusions are drawn:

1) The three university-based TCM schools in Hong Kong have no scheduled teaching on dentistry.

2) The dental school in Hong Kong has no scheduled teaching on TCM.

3) TCM students have little knowledge on dentistry and how to collaborate with dental practitioners on patients presented with oral problems.

4) Dental students have poor knowledge on TCM and how to collaborate with TCM practitioners on patients presented with oral problems.

5) Informative printed and audio-visual promotional materials can be produced with limited resources and used to facilitate the mutual understanding between TCM and dental practitioners.
8. Recommendations

To enrich the learning of the dental students, in particular their knowledge of TCM, addition of learning opportunities on TCM in the dental undergraduate programme is recommended. Similarly, the TCM schools should introduce teaching on basic information about dentistry in the TCM undergraduate curriculum.

To enhance mutual understanding and promote collaboration, more interactions between TCM and dental students are warranted. These activities can be organized by the schools or the student bodies.

It is recommended that continue education courses for practicing dental and TCM practitioners be organized to promote the mutual understanding between the two professions. Furthermore, good quality promotional materials can be produced and distributed to the dental and the TCM practitioners to enrich their knowledge on the practice of the counter profession and hence promote provision of collaborative care to patients with oral health problems.

Upon the establishment of mutual understanding among the dental and the TCM practitioners, health education activities for the public can be organize to raise their awareness of the possibility for having inter-disciplinary treatment and care for better management of oral health problems.
9. Acknowledgements

We would like to express our sincere gratitude and deep regards to our supervisors Prof. Edward Lo, Dr. Harry Pang and Dr. Marcus Fung for their enormous support throughout the project. With their guidance and advice, our study was successfully completed within the limited time.

We would also like to thank all our interviewees and surveyed students for their participation in providing valuable information, as well as the staff of the TCM schools who assisted us greatly in the implementation of interview and survey, and the distribution of promotional materials.
10. References


11. Appendices

Appendix 1. Questions for the head/programme director of the TCM school

1. As the curriculum of Bachelor of Chinese Medicine program covers Western biomedical sciences and medical clinical attachment, does it also cover any western dental knowledge?

2. What are the methods taught in your school to explain and manage oral problems*?

3. In TCM, what is the relationship between “excess heat (re)” and oral problems?

4. How does TCM view dentists’ treatments for general oral problems, such as scaling, dental filling and tooth extraction?

5. In what situation should dentists refer their patients to TCM practitioners for care?

6. In what situation should TCM practitioners refer their patients to dentists for care?

7. What is your view on TCM practitioners and dental practitioners jointly provide collaboration care in treating oral problems?

* Oral problems include toothache, tooth hypersensitivity, tooth decay, temporo-mandibular joint disorder, gingivitis, periodontitis, halitosis, etc.

口腔問題包括牙痛，牙齒敏感，蛀牙，顎關節問題，牙齦炎，牙周炎，口氣等
Appendix 2. Questionnaire for TCM students

We are a group of year 4 students studying in the Faculty of Dentistry at the University of Hong Kong, who are conducting a community health project to promote the mutual understanding between the practitioners and students of Chinese Medicine and those of Dentistry. Your response will only be used for survey purposes. Thank you very much for your time.

1. Which of the following dental treatments is/are regarded as preventive treatment? (Select one or more)
   A) Endodontic treatment (根管治療) □
   B) Filling (補牙) □
   C) Fissure sealant (窩溝封閉) □
   D) Fluoride varnish (氟素塗漆) □
   E) Oral hygiene instruction (口腔護理指導) □
   F) Root debridement (牙根刮治) □

2. According to western dentistry, what is the main cause of periodontal disease (牙周病)? (Select one)
   A) Ageing (年老) □
   B) Dental plaque (牙菌膜) □
   C) Hot air (熱氣) □
   D) Smoking (吸煙) □
   E) Genetic disorder (遺傳性疾病) □

3. According to western dentistry, which of the followings are etiological factors of tooth decay? (Select one or more)
   A) Dental plaque (牙菌膜) □
   B) Dental erosion (牙齒侵蝕) □
   C) Calculus (牙石) □
   D) Susceptible tooth surface □
   E) Dental abrasion (牙齒磨損) □
   F) Dietary carbohydrate □
   G) Tooth worm (牙蟲) □

4. According to western dentistry, what are the possible causes of toothache? (Select one or more)
   A) Fluoride deficiency □
   B) Tooth decay □
   C) Dental trauma (牙齒外傷) □
   D) Calculus (牙石) □
5. Which of the followings is/are treatments which a dentist may use for treating tooth decay? (Select one or more)
   A) Filling (補牙)
   B) Root canal treatment (根管治療)
   C) Prescribe analgesics (止痛藥)
   D) Scaling (洗牙)

6. According to western dentistry, which of the followings is/are natural dental phenomenon of ageing? (Select one or more)
   A) Tooth wear (牙齒磨耗)
   B) Tooth loss (牙齒脫落)
   C) Tooth mobility (牙齒鬆動)
   D) Periodontal disease (牙周病)

7. Which of the followings is/are application of acupuncture in dentistry? (Select one or more)
   A) Intra-operative anesthesia (手術時麻醉)
   B) Anxiety control
   C) Post-operative analgesics (手術後止痛)
   D) Gag reflex (咽反射) control
   E) Treating Bell’s palsy (貝爾氏麻痺)

8. Which of the followings is/are application of herbal medicine in dentistry? (Select one or more)
   A) Treat oral ulcers (口腔潰瘍)
   B) Treat periodontal disease (牙周病)
   C) Treat xerostomia (口乾症)

9. Under what situation should TCM practitioners advise their patients to visit a dentist for treatment?

10. Under what situation should dentists advise their patients to visit a TCM practitioner for treatment?
Appendix 3. Questions for the associate dean of the dental school

1. Does the Bachelor of Dental Surgery program cover Chinese Medicine?
   A. If yes, do you think it is enough?
   B. If no, then why not and do you think it is necessary?

2. Chinese Medicine is receiving more attention in the recent years, would you consider adding more detail in the BDS course?

3. Under which conditions should dentists refer their patients to TCM practitioners for care?

4. Under which conditions should TCM practitioners refer their patients to dentists for care?

5. What is your view on TCM practitioners and dental practitioners providing joint collaboration care in treating oral problems?
Appendix 4. Questionnaire for dental students

We are BDS Group 4.5, who are conducting a community health project to promote the mutual understanding between the practitioners and students of Traditional Chinese Medicine (TCM) and those of Dentistry. Your response will only be used for survey purposes. Thank you very much for your time.

1. Which of the following(s) is/are included in the five Zang (臟) organs in TCM? (Select one or more)
   B) Pancreas (胰) □
   C) Spleen (脾) □
   D) Gallbladder (膽) □
   E) Liver (肝) □
   F) Sanjiao (三焦) □

2. According to TCM, which of the Zang (臟) organ(s) is/are associated with the tissues in the oral cavity?

_____________________________________________________________________

3. Which of the following(s) is/are included in the six Fu (腑) organs in TCM? (Select one or more)
   A) Urinary Bladder (膀胱) □
   B) Gallbladder (膽) □
   C) Appendix (闌尾) □
   D) Pancreas (胰) □
   E) Stomach (胃) □

4. According to TCM, which of the Fu (腑) organ(s) is/are associated with the tissues in the oral cavity?

_____________________________________________________________________

5. According to TCM, toothache is related to: (Select one or more)
   A) Wind-fire (風火) □
   B) Stomach-fire (胃火) □
   C) Wind-worm (風蟲) □
   D) Wind-Cold (風寒) □
   E) Kidney-fire (腎火) □
   F) Asthenic-fire (虛火) □
6. According to TCM, white patches on each of the following regions of the tongue reflect underlying problems of which Zang (臟) organ(s)?

   Anterior: ____________________
   Lateral: ____________________
   Centre: ____________________
   Posterior: ____________________

7. Which of the followings is/are potential application(s) of acupuncture in dentistry? (Select one or more)
   A) Intra-operative anesthesia (手術時麻醉) □
   B) Anxiety control □
   C) Post-operative analgesics (手術後止痛) □
   D) Gag reflex (咽反射) control □
   E) Treating Bell’s palsy (貝爾氏麻痺) □

8. Which of the followings is/are potential application(s) of herbal medicine in dentistry? (Select one or more)
   A) Treat oral ulcers (口腔潰瘍) □
   B) Treat periodontal diseases (牙周病) □
   C) Treat xerostomia (口乾症) □

9. Under what situation should TCM practitioners advise their patients to visit a dentist for treatment?

   __________________________________________

10. Under what situation should dentists advise their patients to visit a TCM practitioner for treatment?

   __________________________________________
Appendix 5. Leaflet for TCM students

Cooperation

For Dentists, if any host factors are suspected, consider suggesting your patient to see a Chinese Medicine practitioner for a consultation.

For Chinese Medicine practitioners, if any local factors relating to the oral cavity are suspected, consider suggesting your patient to see a Dentist for a dental check-up.

Oral conditions that may benefit from cooperation are:
- Periodontal diseases
- Oral ulcer
- Lichen planus
- Burning mouth syndrome
- Temporomandibular joint dysfunctions

Further information

Dental Public Health
Community Health Promotion Office
Bachelor of Dental Surgery
Faculty of Dentistry
The University of Hong Kong

For Dental Health Education Unit,
Department of Health
Useful information about oral health
www.dph.gov.hk
Introduction
Since 2008, the World Health Organization has been advocating the importance of communication between conventional and traditional medicine providers. Building on the same premise, mutual understanding between Dental and Chinese Medical students should be strengthened with an aim to serve the best interests of our patients in an interdisciplinary and holistic manner.

Basic Dental Knowledge

Tooth:
- Crown
- Root

Plaque: It is a film of bacteria adhering to tooth surface, which develops continuously.
- Accumulation of plaque will cause oral health problems
  - Caries
  - Periodontal diseases

Periodontal tissue:
- Gingiva/Gum: a layer of soft tissue, and is pink when healthy.
- Periodontal membrane: a layer of fibrous tissue, to bear chewing pressure.
- Alveolar bone: bony tissue surrounding teeth, for support.

How do Dentists treat these diseases?

Periodontal diseases:
- Remove plaque and plaque retentive factors
  - E.g. calculus
- Oral hygiene instructions
  - E.g. tooth brushing, flossing
- Scaling and root debridement
- Improve host immune response
  - Advise patient to stop smoking
  - Advise uncontrolled diabetic patient to seek medical help

Halitosis:
- Identify causes
  - Diet, smoking
  - Caries, periodontal diseases
  - Infection, dry mouth
  - Systemic diseases
- Treat respectively

Oral ulcer:
- Identify causes
  - Traumatic injury (mechanical, thermal, chemical, radiation)
  - Infection
  - Systemic diseases
  - Idiopathic
- Treat respectively
**Therapeutic philosophies and management approaches**

**Dentists** target local disease causative agents (e.g. bacterium, virus, fungus) and manage the disease by eradicating the etiological agents.

**Chinese Medicine practitioners** emphasize the interaction between host and the external environment (e.g. Yin and Yang, the Five Elements). Management primarily focuses on restoring the body's harmony in a holistic manner.

**Cooperation**

**For Dentists**, if any host factors are suspected, consider suggesting your patient to see a Chinese Medicine practitioner for a consultation.

**For Chinese Medicine practitioners**, if any local factors relating to the oral cavity are suspected, consider suggesting your patient to see a Dentist for a dental check-up.

Oral conditions that may benefit from cooperation are:
- **Periodontal disease** 牙周病
- **Halitosis** 口臭
- **Oral ulcer** 口腔潰瘍
- **Lichen planus** 扁平苔藓
- **Burning mouth syndrome** 熱口症
- **Temporo-mandibular joint dysfunction** 腦顱顎症

**Further information**

Chinese Medicine Division, Department of Health

Promotional Video
https://www.youtube.com/channel/UCnRz7ZD9meTqQ1Z9Og5dpgh/
Introduction

Since 2008, the World Health Organization has been advocating the importance of communication between conventional and traditional medicine providers. Building on the same premise, mutual understanding between Dental and Chinese Medical students should be strengthened with an aim to serve the best interests of our patients in an interdisciplinary and holistic manner.

Basic Chinese Medical Knowledge

Yin and Yang Theories

- Yin 阴 refers to
  - cold  冷  - rest  休息
  - interior  内  - darkness  黑暗

- Yang 阳 refers to
  - heat  热  - movement  运动
  - exterior  外  - lightness  轻

- Their balances ensure normal physiological state of life

The Five Zang Organs and Six Fu Organs

- Zang organs related to oral cavity include Heart, Liver, Spleen and Kidney
- Fu organs related to oral cavity include Stomach, Bladder and Small intestine

Periodontal diseases

- Stomach and intestine fire, heat pattern 胃火上蒸
  - Qing Wei San 清胃散
  - To clear the stomach, drain fire, and reduce pain and swelling

- Kidney Yin vacuity pattern 肾陰虧損
  - Liu Wei Di Huang Wan tang 六味地黃湯
  - To nourish Yin, strengthen bones, and harden teeth

- Deficiency of Qi and blood 氣血不足
  - Ba Zhen Tang 八珍湯
  - To replenish Qi and blood, and strengthen gum and teeth

How do Chinese Medicine practitioners treat these diseases?

Halitosis 口臭:

- Identify causes and treat respectively, e.g.
  - Caries
  - Gan of gum and teeth 牙齦, periodontal diseases
  - Stomach heat
  - Belching of sour foul smelling gas due to food damage 食物, damage to stomach and intestines due to voracious eating
  - Gastrointestinal food stagnation and indigestion
  - Throat diseases

Oral ulcer 口腔潰瘍:

- Stomatitis-healing granule 疣炎潰瘍
- Tripterygium glycosides 雷公藤多甙
- Liu Wei Di Huang 六味地黃丸
- Shen Qi Wan 脳氣丸
Appendix 7. Outline of the promotional video

The Youtube link of video is
https://www.youtube.com/channel/UClRaT5DGnwTGpDrqvW0ijqA/

Brief contents and snapshots are presented as follows.

(i) Introduction
Background information on World Health Organization advocacy and a telephone interview illustrated the importance of communication between conventional and traditional medical providers.

(ii) Case one: periodontal diseases
A female patient, complaining about bad breath and gum bleeding during brushing, went to see a Chinese Medicine practitioner.

He diagnosed the case as stomach and intestine fire and heat pattern 胃火上蒸 and provided treatment of Qing Wei San 清胃散 to drain fire and reduce swelling. Also, he suggested the patient see a Dentist for the poor oral conditions.

The Dentist found out that the patient had severe periodontal diseases with gingival inflammation and deep periodontal pockets at several sites. He then planned to perform oral hygiene instructions, scaling and root debridement.
The patient had her problem solved under the care by both Chinese Medicine practitioner and Dentist, and shared this to her friend.

(iii) Case two: oral ulcer
A male patient, annoyed with recurrent oral ulcer, visited a Dentist who explained that oral ulcer could be caused by many internal and external factors.

He prescribed steroid ointment to help reduce inflammation and arranged blood test for the patient. Meanwhile, to deal with internal factors, he suggested the patient see a Chinese Medicine practitioner.

Damp heat 湿熱 problem was presented, so the Chinese Medicine practitioner advised the patient to reduce consumption of deep fried food and to have herbal medicine to maintain health.

The patient’s oral ulcer had healed, and he revealed a positive feedback towards the interdisciplinary care by Dentist and Chinese Medicine practitioner.
(iv) Closing
Chinese Medicine practitioner and Dentist collaborated with each other with the slogan ‘Coming together is a beginning. Keeping together is progress. Working together is success!’