# Dental therapists' experience in the immediate management of traumatized teeth

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Abstract – The optimal immediate management of traumatized teeth is known to be important for long-term success. One hundred and sixty-seven school dental therapists with General Certificate of Education 'Ordinary' (GCE 'O') level qualification were surveyed on their knowledge and experience on immediate management of dental trauma. The results showed only 41.2% felt comfortable with their present knowledge on the subject. A high proportion of the respondents (94.6%) indicated a need for more knowledge. All therapists concurred on the need to replant a permanent tooth and most (85.1%) agreed that this should be done within 30 min. More than half (54.8%) were not sure of the optimal storage medium for avulsed teeth. Their attitude towards acquiring knowledge in this aspect was good (80.5%) and all would take immediate action to settle appointments for trauma cases.

Since 1949, school dental therapists patterned along the New Zealand School Dental Nurse, have been utilized to provide basic dental care to children in Singapore (1). These dental therapists (formerly known as school dental nurse) work in school dental clinics located in schools which are distributed all over the island of Singapore. They provide dental care to about 390 950 (76.6%) students, aged 6-16 years (2). As the front line providers of dental care, it is inevitable that they are the first to be approached to assist children who sustain orofacial injuries while in schools. Dental trauma is not uncommon in a school setting and has been estimated that one in every 200 school aged child will suffer from tooth avulsion annually (3, 4). Children will risk injuries to their teeth so long as they are active in school or are engaged in contact sports (5). The causes of injuries include falls, collision, fighting or pushing and the intensity and gravity may affect the teeth and the supporting structures. In the case of dental injury, trauma to the anterior teeth is more prevalent (6, 7) and this increases with increasing age (8). Over the last decade, the increase in dental trauma has been attributed to the greater participation in sport activities and rising violence (8, 9).

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Key words: dental trauma; attitude; knowledge; practice; dental therapists

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Although oral injuries beyond the scope of dental therapists are referred to the dentist for his management, it is important that the therapists working in a school environment be equipped with sound knowledge on the management of traumatized teeth. This will ensure the expeditious handling of the patient that will result in a favourable outcome in the treatment and the retention of the traumatized tooth in the oral cavity. The purpose of this study was to gather information on the attitude, knowledge and practice by school dental therapists on the immediate management of traumatized teeth for a possible provision of continuing education.

# **Materials and methods**

Prior to the study, approval was sought from the Public Health Division and the Dental Services of the Ministry of Health. A three-part questionnaire, modified from that used in earlier studies in Singapore (10, 11) was used. Part I of the questionnaire was designed to capture selected characteristics such as years of practice after graduation, educational level of respondents and location of practice. Part II covered acquisition of knowledge and subjective self-assess-

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ment of attitude and practice on emergency management of dental trauma. Part III evaluated knowledge on emergency services for dental trauma and management of avulsed and fractured teeth. The survey forms were distributed to all qualified school dental therapists through the School Dental Service.

The results of the questionnaire were expressed as frequency distribution and computed in percentages. Years of practice were categorized into two, those with 20 or less years as junior dental therapists and those with 20 years and above as senior dental therapists. Chi-square test, Fisher's exact tests and Mann–Whitney *U*-test were employed to analyse data and P < 0.05 was chosen as the level of significance.

## Results

The sample consisted of 209 school dental therapists of which 192 (91.9%) responded. For uniformity, this report, evaluated only 167 dental therapists with General Certificate of Education 'Ordinary' (GCE 'O') level education. The mean age of the therapists was  $21.3 \pm$  SD 7.57 years, while the years in practice ranged from 3 months to 35.5 years. Junior dental therapists made up 42.5% of those who responded.

More junior therapists (40.8%) received knowledge on management of traumatized teeth from their training course whilst their seniors (P = 0.043) obtained this knowledge from continuing education and on the job in the clinic (Table 1). Although half of the senior therapists felt their knowledge on the subject was inadequate yet 94.6% of all dental therapists responded positively on the need for

Table 1. Attitude in immediate management of traumatized teeth

education. The junior therapists (83.6%) showed more enthusiasm for continuing education.

All dental therapists (100%) indicated immediate action was needed for trauma cases (Table 2). There was a significant difference between senior therapists and junior dental therapists in their unwillingness to assist the dentist in trauma cases (P = 0.030, Fisher's exact test). The senior therapists seemed to show more involvement in providing emergency care (46.3%) and their juniors (75.7%) more forward in giving advice on management of dental trauma.

All therapists (100%) agreed that an avulsed permanent tooth should be replanted but not so for the primary dentition (Table 3). Majority of them (85.1%) knew the critical time for replantation and almost all 97.6% knew that an avulsed tooth should be stored in a suitable medium during transportation, yet 54.8% did not know the correct medium to use. All (100%) junior dental therapists had the correct response on the handling of an avulsed tooth compared with 95.8% for the senior dental therapists. Only 26.8% of them were correct in the need for tetanus injection for a replanted avulsed tooth.

On the possibility of reattachment of a fractured tooth fragment, less than half (45.8%) gave the correct response, the junior dental therapist being less knowledgeable. More of the senior dental therapists (62.0%) knew how to advise patients on storage of a tooth fragment before seeking professional help.

Therapists who recommended appropriate hospital/institution for emergency care during office

|                              |                 |      |     | Years in practice |     |      |                 |  |
|------------------------------|-----------------|------|-----|-------------------|-----|------|-----------------|--|
| Attitude                     | Overall         |      | ≤20 |                   | >20 |      |                 |  |
|                              | No.             | %    | No. | %                 | No. | %    | <i>P</i> -value |  |
| Acquisition of knowledge     |                 |      |     |                   |     |      |                 |  |
| Training course              | 55              | 32.7 | 29  | 40.8              | 25  | 26.0 | 0.043           |  |
| Continuing education         | 142             | 84.5 | 61  | 85.9              | 81  | 84.4 | 0.783           |  |
| Dental clinic                | 65              | 38.7 | 24  | 33.8              | 41  | 42.7 | 0.243           |  |
| Others                       | 8               | 4.8  | 3   | 4.2               | 5   | 5.2  | 1.00            |  |
| Self assessed knowledge on e | mergency manage | ment |     |                   |     |      |                 |  |
| Adequate                     | 68              | 41.2 | 34  | 48.6              | 34  | 35.8 |                 |  |
| Inadequate                   | 73              | 44.2 | 25  | 35.7              | 48  | 50.5 |                 |  |
| Not sure                     | 24              | 14.6 | 11  | 15.7              | 13  | 13.7 | 0.156           |  |
| Need for education           |                 |      |     |                   |     |      |                 |  |
| Yes                          | 157             | 94.6 | 66  | 94.3              | 91  | 94.8 |                 |  |
| No                           | 5               | 3.0  | 2   | 2.9               | 3   | 3.1  |                 |  |
| Not sure                     | 4               | 2.4  | 2   | 2.9               | 2   | 2.1  | 1.00*           |  |
| Enthusiasm for education     |                 |      |     |                   |     |      |                 |  |
| Willing                      | 128             | 80.5 | 56  | 83.6              | 72  | 78.3 |                 |  |
| Not willing                  | 3               | 1.9  | 0   | 0                 | 3   | 3.3  |                 |  |
| Not sure                     | 28              | 17.6 | 11  | 16.4              | 17  | 18.5 | 0.383*          |  |

\*Fisher's exact test is used. Chi-square test is used for others.

| Table 2.  | Practice  | in | immediate | management | of  | traumatized     | teeth  |
|-----------|-----------|----|-----------|------------|-----|-----------------|--------|
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|                                  | Overall |      | ≤20 |      | >20 |      |                 |
|----------------------------------|---------|------|-----|------|-----|------|-----------------|
| Practice                         | No.     | %    | No. | %    | No. | %    | <i>P</i> -value |
| Action for treatment             |         |      |     |      |     |      |                 |
| Immediate                        | 167     | 100  | 71  | 100  | 96  | 100  |                 |
| Next available appointment       | 0       | 0    | 0   | 0    | 0   | 0    |                 |
| Do not know                      | 0       | 0    | 0   | 0    | 0   | 0    |                 |
| Advice to patients               |         |      |     |      |     |      |                 |
| Yes                              | 117     | 71.3 | 53  | 75.7 | 64  | 68.1 |                 |
| No                               | 42      | 25.6 | 16  | 22.9 | 26  | 27.7 | 0.438*          |
| Others                           | 5       | 3.1  | 1   | 1.4  | 4   | 4.3  |                 |
| Assisted dentists in management  |         |      |     |      |     |      |                 |
| Yes                              | 74      | 44.6 | 31  | 44.3 | 43  | 44.8 |                 |
| No                               | 87      | 52.4 | 34  | 48.6 | 53  | 55.2 | 0.030*          |
| Not sure                         | 5       | 3.0  | 5   | 7.1  | 0   | 0    |                 |
| Provision of emergency treatment |         |      |     |      |     |      |                 |
| Yes                              | 70      | 42.2 | 26  | 36.6 | 44  | 46.3 |                 |
| No                               | 96      | 57.8 | 45  | 63.4 | 51  | 53.7 | 0.211           |

\*Fisher's exact test is used. Chi-square test is used for others.

Table 3. Knowledge on immediate management of avulsed and fractured teeth

|                                       | 0\          | verall        | ≤20 years in practice |               | >20 years in practice |               |                 |
|---------------------------------------|-------------|---------------|-----------------------|---------------|-----------------------|---------------|-----------------|
| Knowledge                             | Correct (%) | Incorrect (%) | Correct (%)           | Incorrect (%) | Correct (%)           | Incorrect (%) | <i>P</i> -value |
| Replantation of primary teeth         | 58.4        | 41.6          | 50.0                  | 50.0          | 65.3                  | 34.7          | 0.049           |
| Replantation of permanent teeth       | 100         | 0.0           | 100                   | 0.0           | 100                   | 0.0           |                 |
| Critical time for replantation        | 85.1        | 14.9          | 87.3                  | 12.7          | 84.4                  | 15.6          | 0.591           |
| Transportation of teeth               | 97.6        | 2.4           | 98.6                  | 1.4           | 96.9                  | 3.1           | 0.473           |
| Types of media                        | 45.2        | 54.8          | 43.7                  | 56.3          | 46.9                  | 53.1          | 0.680           |
| Handling tooth                        | 97.6        | 2.4           | 100                   | 0.0           | 95.8                  | 4.2           | 0.137*          |
| Tetanus vaccination                   | 26.8        | 73.2          | 25.4                  | 74.6          | 27.1                  | 72.9          | 0.802           |
| Reattaching fracture tooth            | 45.8        | 54.2          | 36.6                  | 63.4          | 52.1                  | 47.9          | 0.047           |
| Storing fractured Tooth               | 55.6        | 44.4          | 47.8                  | 52.2          | 62.0                  | 38.0          | 0.074           |
| Emergency service during office hours | 87.5        | 12.5          | 77.5                  | 22.5          | 94.8                  | 5.2           | 0.001           |
| Emergency service after office hours  | 40.5        | 59.5          | 40.8                  | 59.2          | 39.6                  | 60.4          | 0.869           |

\*Fisher's exact test is used. Chi-square test is used for others.

hour was significantly more than those who did not (Mann–Whitney *U*-test, P = 0.001).

There was no significant difference in the total number of correct answer between dental therapists who knew the available emergency services after office hours and those dental therapists who did not (P = 0.272, Mann-Whitney U-test).

## Discussion

The School Dental Service in Singapore reaches out to all school children aged 6–16 years both local and foreigners studying in schools under the purview of the Ministry of Education. It provides a unique nationwide service in that dental care is brought free of charge to the doorstep of the children in schools. Inequalities of dental care for school children are therefore not a concern in Singapore. The dental care has traditionally been delivered from fixed dental clinics located in school buildings or through mobile dental clinics where fixed clinics are not available. Dental therapists being the frontline providers of dental care in the school dental clinics are often called upon to assist when children sustain injuries whether dental or otherwise whilst in school. It is important and prudent that they be equipped with the knowledge, understanding and the procedure on the management of dental trauma so that in the absence of the dentist they will be aware of the precautions and the steps to follow in managing the injury.

This survey on dental therapists enjoyed a good response of 91.9%. This could most probably be because of the personal approach of the supervisory Higher Dental Therapists. From the study (Table 1), the junior dental therapists (48.6%) appeared to be more confident in the self-assessed knowledge on emergency handling of traumatized teeth compared with their seniors (35.8%). This is reflected by the higher number of advice given to patients (71.3%) and the apparent more willingness (83.6%) to contribute towards continuing education by the young dental therapists. This could in part be attributed to the increased dental trauma curriculum incorporated into the training course in the recent years (40.8%) while their seniors earned more on-the-job piece meal knowledge (42.7%). Nevertheless, about a quarter of both groups of dental therapists felt that they should leave it to dentists who are more knowledgeable to advise the patient on the subject matter despite the positive attitude of all therapists in taking immediate action for dental trauma cases which is encouraging. In addition, 94.6% of dental therapists indicated that the continuing dental education, being the major source of knowledge (84.5%), including the campaign on emergency management of traumatized teeth are strongly needed. Taken together, it appears that the subject on dental trauma should be better structured in the dental therapist course and further developed in the continuing dental education.

Dental therapists might assist dentists (44.6%) or provide immediate managements as indicated in this survey (42.2%) before referring for further managements. Although it seemed that senior therapists had more exposure in this dealing (46.3%) likely to be because of their longer years in the service, less than half of the dental therapists knew the emergency services available after office hours (40.5%). It is disheartening to note that for health personnel on the job, this result is no better than the other subset of local population on patients and parents' awareness on immediate management of traumatized teeth where 71 and 41% of the respondents could give the correct answer on during and after office hours services respectively (10). It is likely that dental therapists paid less attention to this aspect of knowledge and tended to leave the referral of trauma cases to the supervisory dentists.

Sound knowledge on the immediate replantation, including the handling of the avulsed teeth (13, 14), if not the method of storage and preservation in avoidance of periodontal membrane degeneration is important for the long-term success of replanted avulsed tooth (8, 12, 14). While it is encouraging to note that all dental therapists were very positive on the replantation of an avulsed permanent tooth, 85.1% of which recognized the critical time of 30 min for avulsed tooth replantation (15) and 97.6% knew how to handle as well as what advice to give on transportation of avulsed teeth, their knowledge was weak on the replantation of an avulsed primary tooth and on the optimal medium (45.2%) with a compatible pH and osmolality (15, 15)16).

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Therapists' knowledge on management of fractured teeth needs improvement. Less than half of them (45.8%) knew the possibility of reattachment of a fractured tooth fragment and slightly more than half (55.6%) had knowledge on the storage of fractured tooth fragment. The senior therapists were better than the young therapists in the concept on management of fractured teeth.

The observation that only one quarter of the therapists were aware of the anti-tetanus protocol, possibly related to the fact that most therapists in the School Dental Service would leave this aspect of management to the dentists to determine, points to the need of multidisciplinary teamwork that not only involves different medical/dental specialties but also essential that all dental therapists have sound knowledge on dental trauma management. Optimal immediate management of traumatized teeth facilitating subsequent optimal follow up management would bring about higher success in the treatment of avulsed and fractured teeth.

### Conclusions

The information obtained in this study indicates that:

- **1** Generally, dental therapists' information of dental trauma needs reinforcing.
- **2** Areas of weakness are, storage media for avulsed teeth, tetanus vaccination, management of fractured teeth and availability of services after office hours.
- **3** There tend to be too much reliance on the dentists to manage trauma cases.

*Acknowledgements* – The authors would like to thank:

- **1** The Ministry of Health and the School Dental Service for granting permission and giving full cooperation to conduct the survey.
- **2** The Higher and Senior Dental Therapists for the distribution and collection of the survey forms.

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