<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th>Perceptions of single-visit and multiple-visit endodontic treatment: a survey of endodontic specialists and general dentists in Hong Kong</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author(s)</strong></td>
<td>Wong, AWY; Zhang, S; Zhang, C; Chu, CH</td>
</tr>
<tr>
<td><strong>Citation</strong></td>
<td>Journal of Investigative and Clinical Dentistry, 2016, v. 7 n. 3, p. 263-271</td>
</tr>
<tr>
<td><strong>Issued Date</strong></td>
<td>2016</td>
</tr>
<tr>
<td><strong>URL</strong></td>
<td><a href="http://hdl.handle.net/10722/234456">http://hdl.handle.net/10722/234456</a></td>
</tr>
<tr>
<td><strong>Rights</strong></td>
<td>This is the accepted version of the following article: Journal of Investigative and Clinical Dentistry, 2016, v. 7 n. 3, p. 263-271, which has been published in final form at <a href="http://onlinelibrary.wiley.com/ol1/doi/10.1111/jicd.12154/abstract">http://onlinelibrary.wiley.com/ol1/doi/10.1111/jicd.12154/abstract</a></td>
</tr>
</tbody>
</table>
Perceptions of single-visit and multiple-visit endodontic treatment: a survey on endodontic specialists and general dentists in Hong Kong

Amy Wai-Yee Wong, Cheng-Fei Zhang, Chun-Hung Chu
Faculty of Dentistry, The University of Hong Kong, Hong Kong, China.

Correspondence to:
Dr. Chun-Hung Chu
Faculty of Dentistry,
The University of Hong Kong,
3B61, Prince Philip Dental Hospital,
34 Hospital Road, Hong Kong SAR, China
Tel: 852 2859 0371; Fax: 852 2559 9013
Email: chchu@hku.hk
Abstract

Objectives: This survey aims to study the preference of practice of single-visit and multiple-visit endodontic treatment by endodontists and general dental practitioners (GDPs) in Hong Kong, and to investigate their reasons to choose single-visit or multiple-visit treatment in their practice.

Method: An anonymous questionnaire was mailed to all 16 registered endodontists and 800 randomly selected GDPs in Hong Kong to explore their preference and reasons of practicing single-visit and multiple-visit endodontic treatment on their patients. Information on their use of magnifying loupes, microscope and their year of dental practice were also collected.

Results: A total of 8 endodontists and 429 GDPs returned their questionnaires and the response rate was 50% and 53.6%. Among these 404 of 429 GDPs (94.2%) practiced endodontic treatment. For those performing endodontic treatment, their mean (±SD) years of practice was 23.6±4.8 for endodontists and 15.3±9.1 for GDPs. Majority of endodontists used surgical microscope. For GDPs, only 25 (6.2%) used surgical microscope and 123 (30.4%) used magnifying loupes during endodontic treatment. Most endodontists (n=7, 87.5%) and GDPs (n=375, 92.8%) predominantly performed multiple-visit treatment. The commonest reason for choosing multiple-visit treatment for endodontists and GDPs were the positive effects of inter-appointment medications (n=3, 37.5%) and the tooth treated had doubtful prognosis (n=103, 25.5%) respectively. While the commonest reason for choosing single-visit treatment for endodontists and general dentists were the same that treatment can be completed in one visit (n=4, 50%) and (n=127, 31.4%).

Conclusion: According to this survey, most Hong Kong endodontists and GDPs preferred offering multiple-visit endodontic treatment.
Introduction

Traditional endodontic (root canal) treatment used to take multiple visits to complete, with one of the main reasons for this being that it requires a considerable amount of time to complete the treatment. The use of contemporary endodontics techniques and equipment such as magnifying devices, electronic apex locators, engine-driven rotary nickel titanium files, and so forth not only increases the success rate of endodontic treatment, but also shortens the time needed for the treatment. Endodontic treatment may therefore be completed in a single visit. In fact, the concept of single-visit endodontic treatment is not new, the single-visit and multiple-visit endodontic treatment has been the subject of discussion among the dental professionals for many years yet there has been no definitive conclusion to the debate (Sathorn et al. 2009). Some of the unresolved issues include possible differences in anticipated success rate, clinical outcomes, microbiological concerns, pain and other post-treatment complications. This controversy can be investigated and a recent systematic review could not found significant difference in treatment outcome (Wong et al. 2014). The decision of dentists to choose single-visit or multiple visit endodontic treatment clinicians may be influenced not only by effectiveness, complications and cost but also by factors such as patient and/or operator comfort, preference and satisfaction (Sackett 2000).

Sathorn et al. (2009) pointed out that an important consideration in treatment decision-making is the human factor (Sathorn et al. 2009). The treatment decision-making is highly dependent on the dentists, and they in general are more influential than any other parties in the treatment decision. They in many cases are not likely to offer patients a choice between single-visit and multiple-visit treatments because their clinical perceptions including treatment philosophy, rationale and preference for the different treatment options (Sathorn et al. 2009). This is in particular pertaining to endodontic treatment, which is a skill-dependent
procedure. The choice of treatment depends on the dentist skill, experience and preference, comfort, habit and convenience. The implementation of new concepts, treatments or techniques may depend not only on their biological rationale or effectiveness. Some clinical procedures are not widely implemented for the simple reason that they are too difficult or too inconvenient to perform, even though they have a strong biological rationale. Infrequent use of magnifying loupes and application of rubber dam are two common examples in dental practice. Messer (1999) concluded that the clinical judgment for general dental practitioners GDPs on endodontic treatment would be complicated and not relied simply on the practical clinical aspects (Messer 1999).

A recent study in Brazil reported that Florianopolis-Brazil endodontists prefer multiple-visit over single-visit endodontic treatment when the tooth had pulp necrosis (Netto et al. 2014). Another study reported that Australian endodontists strongly preferred multiple-visit over single-visit root canal treatment even in cases where biological concerns were not an issue (Sathorn et al., 2009). Furthermore, they found that operator preference rather than biological or patient considerations appeared to be the primary determinant of treatment choice. Inamoto et al (2002) suggested that single-visit endodontic treatment was not popular in Japan, and in US, only approximately one third of the dentists would perform root canal obturation at the first visit in infected root canal cases (Inamoto et al. 2002). One survey also reported that most of the Flemish GDPs completed the endodontic treatment in two-visits (Slaus & Bottenberg 2002). However, a study using self-administered questions in US found most patients preferred single-visit endodontic treatment regardless of success rates (Vela et al. 2012). A literature search found that there was no study conduct to investigate the dentist’s preference of choosing single-visit or multiple-visit treatment in Hong Kong. The objective of this study was therefore to study the preference of practice of single-visit and
multiple-visit endodontic treatment by endodontic specialists and general dentists in Hong Kong, and to investigate their reasons to choose single-visit or multiple-visit treatment in their practice.

Method

This study was conducted in February to June 2014 with ethics approval from the Institutional Review Board of the University of Hong Kong / Hospital Authority Hong Kong West Cluster (HKU/HA HKW IRB UW No. 14-131). The study population was divided into two groups, 1) endodontist and 2) GDP. There are 2,087 GDPs from the general register and 16 endodontists from the specialist register of the Hong Kong Dental Council. This study invited all 16 registered endodontists and randomly selected 800 GDPs for a questionnaire survey. An invitation letter was sent in February 2014 with an anonymous self-administered questionnaire attached (Figure 1). They were asked to complete and to return the questionnaire with the self-addressed stamped envelope or by facsimile. A reminder mail was sent to all invited clinicians after 4 weeks to encourage the response rate of the survey.

Before designing the questionnaire, a systematic literature search was performed (Wong et al. 2014) and the common factors influencing the choice of using single-visit and multiple-visit endodontic treatment were identified. Information on perception of single-visit and multiple-visit endodontic treatment from the selected general dentists and endodontists was obtained, and a total of 10 close-ended questions were developed in the one page questionnaire. The questionnaire was pilot tested to 10 dentists and feedbacks were collected before the main study. Amendments were made according to the 10 dentists’ comments. The final questionnaire contained a list of identified common influencing factors for single-visit and
multiple-visit endodontic treatment; and the participants were asked to indicate their degree of agreement with the statements on a 3-point Likert scale (agree; neutral; disagree). Their year of clinical dental practice, use of magnification devices (magnifying loupes and microscope) and prevalence of single-visit and multiple-visit endodontic treatment was also asked.

The data collected were entered into a personal computer and analysed with the software IBM SPSS Statistics 20.0. Chi-square tests were used to evaluate the differences in prevalence of single-visit endodontic treatment by the dentists using magnification and those without using magnification. The level of statistical significance was set at 0.05.

**Results**

A total of 8 endodontists and 429 GDPs returned their questionnaires and the response rate was 50% and 53.6%. Among these 429 GDPs, 25 (5.8%) did not perform endodontic treatment. For those GDPs performing endodontic treatment (n=404, 94.2%), their mean (±SD) years of practice was 15.3±9.1 compare to 23.6±4.8 for endodontists. The mean year (±SD) of practice of the 373 GPDs preferred multiple-visit endodontic treatment was 15.1 ± 9.2, which is significantly lower (p=0.048) than (19.3 ± 7.6) of the 26 general dentists who preferred single-visit endodontic treatment. One endodontist (12.5%) and 20 (5.0%) GDPs performed single-visit and multiple-visit endodontic treatment equally. Most endodontists (n=7, 87.5%) and GDPs (n=375, 92.8%) predominantly performed multiple-visit treatment. Almost all endodontists (n=7, 87.5%) used surgical microscope for endodontic treatment compared with only 25 GPDs (6.2%) used. It was relatively more GPDs used magnifying loupes instead (n=123, 30.4%). There was 274 GDPs (67.8%) not using both magnifying
devices. Among the 123 GDPs who used magnifying loupe for endodontic treatment, 13 preferred single-visit endodontic treatment. There were only 13 out of 265 the GDPs not using magnification preferred single-visit endodontic treatment. The difference is statistically significant (13/123 vs. 13/265, p=0.023).

**Reasons for choosing multiple-visit and single-visit treatment**

The commonest reasons of endodontists for choosing multiple-visit were positive effects of inter-appointment medications (n=3, 37.5%) and lengthy treatments can be shortened into several appointments (n=2, 25%). It was different to GDPs which the commonest reasons for GDPs were the tooth treated had doubtful prognosis (n=103, 25.5%) and allowing time for lessening of symptoms (n=93, 23.0%) (Figure 4).

While the commonest reasons of endodontists for choosing single-visit treatment were treatment can be completed in one visit (n=4, 50%), better recall of root canal morphology (n=3, 37.5%) and patient time constraint (n=1, 13%). It showed similar beliefs in GDPs which the commonest reasons of GDPs for choosing single-visit treatment were treatment can be completed in one visit (n=127, 31.4%), patient time constraint (n=74, 18.3%) and better recall of root canal morphology (n=45, 11.1%) (Figure 5).

**Discussion**

This survey was conducted to all 18 Hong Kong endodontists and a random sample of GDPs. A postal reminder was sent 4 weeks after sending out the questionnaire. The response rate was at least 50% for both the GDPs and endodontists, and it is considered satisfactory for an anonymous questionnaire survey (Evans 1991). To conduct a cost effective survey, a random
sample of 800 GDPs was selected due to the large number of registered GDPs in Hong Kong. Further increase the sample frame may incur cost and may not increase the validity of the survey results or affect the representativeness of the sample (Glidewell et al. 2012). Evans (1991) stated that the survey is better to be performed in random samples with high response rates rather than large non-random samples with low response rate (Evans 1991).

The questionnaires collected most of the common reasons why clinicians considered single-visit and multiple-visit endodontic treatment. This could be attributed to the thorough literature search performed to study the criteria for clinicians in choosing single-visit and multiple-visit endodontic treatment in the design of the questionnaire. The questionnaire was pilot tested to 10 dentists and feedbacks were collected before the main study. The one-page questionnaire contains close-ended questions which were asked were easily understood and quick to complete. This could contribute to the high response rate of this survey.

In this study, both GDPs and endodontists in Hong Kong preferred multiple-visit endodontic treatment. Majority of the GDPs and endodontists expressed neither single-visit nor multiple-visit would bring better success rate over the other. This finding was similar to other studies reported in Australia (Sathorn et al. 2009), Belgium (Slaus & Bottenberg 2002), Denmark (Bjorndal & Reit 2005), Japan (Inamoto et al. 2002) and U.S. (Calhoun & Landers 1982; Dastmalchi et al. 2011) although the training backgrounds could be different among countries. It was also common to find that most clinicians practiced multiple-visit endodontic treatment on their patients.

A survey performed in U.S. showed that majority patients’ preference preferred single-visit (Vela et al. 2012). However, the survey reported that patients would accept multiple-visit if
the dentists could show the success rate superior than single-visit. There is so far no study in Hong Kong reported patients’ preference on single-visit versus multiple-visit endodontic treatment. In general, patients tend to decide their treatment option after discussion with their dentist (Chu and Lo, 1999). Results of this study showed that patients’ preference for multiple-visit treatment might not significantly affect clinicians’ decision. The results in this study also showed majority of endodontists who had training on magnification utilized magnifying devices in performing endodontic treatment. Magnification was shown a factor that affected the efficiency and success rate of endodontic treatment (Wong et al., 2014). However, only about one third of GDPs in Hong Kong used magnification in their endodontic treatment. Continuing dental education should therefore be promoted to enhance dentists’ skills and knowledge. This survey found more young GDPs preferred multiple-visit treatment. Further study can be performed to explore if this can be due to their level of competency and experience on endodontic treatment.

The most importance reason for choosing multiple-visit endodontic treatment by the GDPs was that “the tooth with doubtful prognosis can be assessed during treatment process”. For the endodontist, multiple-visit endodontic treatment allowed time for lessening of symptoms before obturation. This study also found that endodontists showed more consistent on the reasons in choosing single- or multiple-visit endodontic treatment, whereas the GDPs showed more diversified in their reasons for the treatment. The results were similar to other studies (McCaul et al. 2001; Dechouniotis et al. 2010); and the phenomenon reflected on the effect of the similar specialist training among endodontists with most consistent agreement (Dechouniotis et al. 2010). The GDPs who provide comprehensive dental care may spend more time on the assessment for the factors affecting the outcome of the endodontic treatment. A common practice for GDPs is to decide on next stage of treatment planning
including extractions followed by replacement with prostheses. Most GDPs would refer their patients to endodontists (Wolcott & Terlap 2014) for treatment particularly on complex restorative cases (Messer 1999; Alani et al. 2011).

This study found most endodontists in Hong Kong preferred multiple-visit endodontic treatment. One of the main reasons could be that they need to manage complicated cases referred by the GDPs. These complicated cases often require lengthy treatments that could be uncomfortable to both the clinician and the patients. Therefore, they preferred dividing the treatment into several shorter appointments. On the contrary, the two most important reasons for choosing single-visit considered by both the endodontists and the GDPs was the treatment can be completed in one-visit and patient time constraint. The decisions on single-visit come with the influences by patients’ factor. The clinicians would discuss with patients on treatment natures and consequences before finalized the treatment planning. This may increase the patients’ confidences toward clinicians (Bornstein et al. 2000). Bornstein (2000) found that the patients’ preferences towards clinicians related more on ease of getting appointment and flexible time. However, they considered little on neither dentists’ age, gender, professional qualifications nor clinics’ appearance.

The clinicians in Hong Kong generally agreed less on the multiple-visit treatments would bring along lesser pain and higher success rate. This finding was in agreement with the study by Raju et al. (2014). Some of the endodontists could believe the advantages of leaving inter-appointment medications dressed in root canals. Some studies showed that the effect of calcium hydroxide increase the success rate in multiple-visit (Silveira et al. 2007; Siqueira et al. 2007). Other studies showed the effects of calcium hydroxide cannot be over-weighted (De Moor 2003; Sathorn et al. 2007). One of the reasons to be considered to perform single-
visit treatment by endodontists and GDPs was single-visit treatment has a better recall of root
canal morphology.

Previous studies reported lack of significant difference on the post-operative pain and success
rate between multiple-visit and single-visit treatment (Figini et al. 2007; Wong et al. 2014).
Since many dental schools taught multiple-visit endodontic treatment, it was not difficult to
understand that most clinicians prefer the multiple-visit treatment. Once they develop this
habit of practice, it may be difficult to change clinicians’ practice performance just based on
the methods published literatures and knowledge delivery by conferences. Davis (1995)
stated that it may be more effective ways to change practice behaviour by practice-based and
outreach visit interventions (Davis et al. 1995).

In this study, there was lack of information to explain the specific cases on the decision for
single-visit and multiple-visit endodontic treatment. Clinicians tended to perform single-visit
bases on different clinical aspects. Yap et al. (2014) recently reported that single-visit root
canal treatments would be needed on special needs patients to retain their dentition (Yap et al.
2014). This may have different reason to implement single-visit treatment. Further studies
were suggested to investigate the criteria of performing single-visit versus multiple-visit
endodontic treatment.

Conclusion

According to this survey, According to this survey, most Hong Kong endodontists and GDPs
preferred offering multiple-visit endodontic treatment. The commonest reasons for their
preference of single or multiple-visit endodontic treatment were similar.
Acknowledgement
The authors would like to acknowledge Ms Courtney Wingyan Keung for her support to conduct this survey.

References


Figure 1 Anonymous self-administered questionnaire

<table>
<thead>
<tr>
<th>Question</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Are you currently practicing RCT?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2. How are you currently practicing RCT?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3. What factors would you consider for multiple-visit RCT?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Lengthy treatments can be shortened into several appointments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. curved canal, multiple canals)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Tooth with doubtful prognosis can be assessed during the treatment process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Positive effects of inter-appointment medications brushed in root canal(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Allow time for lessening of symptoms before obturation (e.g. pain, abscess)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Reduction of post-operative pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. High success rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Easy collection of treatment fees for multiple visits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Dentists' preference/favourable previous experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Patients' preference/favourable previous experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. Patient time constraint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K. Dentist time constraint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. Others (please specify):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4. Which factor above in Q3 would you consider the most important for you to do multiple-visit RCT?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Put a letter from A to L).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q5. Which factors would you consider for single-visit RCT?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Better recall of root canal morphology within same visit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Lower risks and complications of local anaesthetics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Decreased instrumentation procedural errors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Decreased material wastage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Treatment can be completed in one visit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. High success rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Dentists' preference/favourable previous experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Patients' preference/favourable previous experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Patient time constraint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. Dentist time constraint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K. Others (please specify):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q6. Which factor above in Q5 would you consider the most important for you to do single-visit RCT?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Put a letter from A to K).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q7. Do you perform RCT using a magnifying loupe?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q8. Do you perform RCT using a microscope?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q9. In general, would you prefer multiple-visit or single-visit RCT?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q10. How many years have you been practicing dentistry?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The End. Thank you.
Figure 2 Factors influencing the choice on multiple-visit endodontic treatment by GDPs and endodontists in Hong Kong

- Easy collection of treatment fees for multiple visits
- Patients’ preference/favourable previous experience
- Patient time constraint
- Reduction of post-operative pain
- High success rate
- Dentist time constraint
- Dentists’ preference/favourable previous experience
- Positive effects of inter-appointment medications dressed in root canal(s)
- Lengthy treatments can be shortened into several appointments
- Tooth with doubtful prognosis can be assessed during the treatment process
- Allow time for lessening of symptoms before obturation (e.g. pain, abscess)

GDP (N=404)
Endodontist (N=8)
Figure 3 Factors influencing the choice on single-visit endodontic treatment by GDPs and endodontists in Hong Kong

- Treatment can be completed in one visit
- Patient time constraint
- Better recall of root canal morphology within same visit
- Dentist time constraint
- Decreased material wastage
- Lower risks and complications of local anesthetics
- Decreased instrumentation procedural errors
- Patients’ preference/favourable previous experience
- Dentists’ preference/favourable previous experience
- Lower risks and complications of local anesthetics
- High success rate
- Others

GDP (N=404)
Endodontist (N=8)
Tooth with doubtful prognosis can be assessed during the treatment process.

Allow time for lessening of symptoms before obturation (e.g. pain, abscess)

Lengthy treatments can be shortened into several appointments

Positive effects of inter-appointment medications dressed in root canal(s)

High success rate

Dentists’ preference/favourable previous experience

Patient time constraint

Easy collection of treatment fees for multiple visits

Others

Reduction of post-operative pain

Dentist time constraint

Patients’ preference/favourable previous experience

Others

GDP (N=404)

Endodontist (N=8)

Figure 4 The most important factor to consider in multiple-visit endodontic treatment by GDPs and endodontists in Hong Kong.
Figure 5 The most important factor to consider in single-visit endodontic treatment by GDPs and endodontists in Hong Kong

- Decreased material wastage
- Patients’ preference/favourable previous experience
- Lower risks and complications of local anesthetics
- Dentist time constraint
- Decreased instrumentation procedural errors
- Dentists’ preference/favourable previous experience
- Others
- High success rate
- Better recall of root canal morphology within same visit
- Patient time constraint
- Treatment can be completed in one visit

GDP (N=404) vs. Endodontist (N=8)