A STUDY ON THE INDICATIONS FOR ROOT CANAL THERAPY AT THE UNIVERSITY OF NAIROBI DENTAL HOSPITAL BETWEEN 2004 AND 2009

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V28/ 2057/ 2007
BDS LEVEL III

A Community Dentistry Research Project Submitted in Partial Fulfillment of the Degree of Bachelor of Dental Surgery (BDS) at the University of Nairobi 2010
DECLARATION

I, Kamere Elaine Wanjiku, hereby declare that this is my original work and has not been submitted elsewhere, by any other person, for research purposes or awards of any degree.

Signature.................................. Date.............................................
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DEDICATION

To Jack and Emily Kamere, for your continual support and prayers, and for always believing in me
To Annette, Catherine and Danielle Kamere for your love and for encouraging me to follow my dreams
To Caroline Muthoni and Alison Wachke for your care, love and support all these years.
And, to Peter Odawa, my best friend.
ACKNOWLEDGEMENTS

To the Almighty God, without whom, I would never have accomplished this task.

I would like to offer my sincere gratitude to my supervisors, Dr. L W. Gathece and Dr. T. J. M. Dienya who spent many hours reading, correcting and providing extensive advice and information throughout the study period.

I would also like to thank my classmates who have assisted me so willingly in collection of data and also made available their suggestions and knowledge that has assisted in the writing of this report.
# TABLE OF CONTENTS

- DECLARATION ........................................................................................................... II
- SUPERVISORS' APPROVAL ....................................................................................... III
- DEDICATION ............................................................................................................. IV
- ACKNOWLEDGEMENTS .......................................................................................... V
- TABLE OF CONTENTS ............................................................................................. VI
- LIST OF TABLES AND FIGURES ............................................................................. VIII
- ABBREVIATIONS AND DEFINITIONS OF TERMS ................................................ IX
- ABSTRACT ................................................................................................................ X
- CHAPTER 1: INTRODUCTION ................................................................................... 1
- CHAPTER 2 ............................................................................................................... 3
  - 2.1: LITERATURE REVIEW ...................................................................................... 3
  - 2.2: STATEMENT OF THE RESEARCH PROBLEM ............................................. 7
  - 2.3: JUSTIFICATION OF THE STUDY ................................................................. 7
  - 2.4: RESEARCH HYPOTHESIS .............................................................................. 8
    - 2.4.1: Null hypothesis .......................................................................................... 8
    - 2.4.2: Alternative hypothesis .............................................................................. 8
  - 2.5: OBJECTIVES .................................................................................................. 8
    - 2.5.1: Main objective ......................................................................................... 8
    - 2.5.2: Specific objectives ................................................................................... 8
- CHAPTER 3: MATERIALS AND METHODS ............................................................. 9
  - 3.1: STUDY DESIGN ............................................................................................. 9
  - 3.2: STUDY AREA ................................................................................................ 9
  - 3.3: STUDY POPULATION .................................................................................... 9
  - 3.4: SAMPLE SIZE DETERMINATION ................................................................. 9
  - 3.5: SAMPLING METHOD ..................................................................................... 10
  - 3.6: INCLUSION CRITERIA .................................................................................... 10
  - 3.7: EXCLUSION CRITERIA ................................................................................ 10
  - 3.8: VARIABLES .................................................................................................. 11
    - 3.8.1: Sociodemographic variables .................................................................. 11
    - 3.8.2: Independent variables ........................................................................... 11
    - 3.8.3: Dependent variables .............................................................................. 11
  - 3.9: DATA COLLECTION ...................................................................................... 12
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.10: DATA ANALYSIS AND PRESENTATION</td>
<td>12</td>
</tr>
<tr>
<td>3.11: MINIMIZING ERRORS</td>
<td>12</td>
</tr>
<tr>
<td>3.12: ETHICAL CONSIDERATIONS</td>
<td>12</td>
</tr>
<tr>
<td>3.13: PERCEIVED BENEFITS</td>
<td>13</td>
</tr>
<tr>
<td>3.14: STUDY LIMITATIONS</td>
<td>13</td>
</tr>
<tr>
<td>CHAPTER 4: RESULTS</td>
<td>14</td>
</tr>
<tr>
<td>CHAPTER 5: DISCUSSION</td>
<td>31</td>
</tr>
<tr>
<td>CHAPTER 6: CONCLUSION AND RECOMMENDATIONS</td>
<td>34</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>35</td>
</tr>
<tr>
<td>APPENDIX 1- CHECK LIST</td>
<td>37</td>
</tr>
<tr>
<td>APPENDIX 2- CONSENT FORM</td>
<td>38</td>
</tr>
<tr>
<td>APPENDIX 3- BUDGET</td>
<td>39</td>
</tr>
</tbody>
</table>
LIST OF TABLES AND FIGURES

1. **TABLES**
   - Table 1: Distribution of the indication for root canal therapy and age of the patients
   - Table 2: Distribution of sex and indication for root canal therapy

2. **FIGURES**
   - Figure 1: Distribution of age and sex of the patients
   - Figure 2: Distribution of sex and type of tooth treated
   - Figure 3: Distribution of age and maxillary teeth
   - Figure 4: Distribution of age and mandibular teeth
   - Figure 5: Indications for root canal therapy
   - Figure 6: Indications for root canal therapy in incisors and canines
   - Figure 7: Indications for root canal therapy in premolars
   - Figure 8: Indications for root canal therapy in molars
   - Figure 9: Distribution of retreatment among incisor teeth
   - Figure 10: Distribution of retreatment among premolar teeth
   - Figure 11: Distribution of retreatment among molar teeth
   - Figure 12: Distribution of retreatment against the indications for root canal therapy
   - Figure 13: Distribution of retreatment against the sex of the patients
   - Figure 14: Distribution of retreatment against age of the patients.
<table>
<thead>
<tr>
<th>ABBREVIATION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDS</td>
<td>Bachelor of Dental Sciences</td>
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<td>CIBRD</td>
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<td>FDS</td>
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<td>MDSe</td>
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<td>SDS</td>
<td>School of Dental Sciences</td>
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<td>SPSS</td>
<td>Statistical Package for the Social Sciences</td>
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<tr>
<td>UON</td>
<td>University of Nairobi</td>
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<td>UNDH</td>
<td>University of Nairobi Dental Hospital</td>
</tr>
</tbody>
</table>
ABSTRACT

BACKGROUND
Endodontic treatment forms an essential part of comprehensive quality dental care. The success of endodontic therapy is dependent on proper understanding of pulpal diseases. This understanding has led to proper diagnosis, total tooth isolation, complete caries removal, thorough debridement, irrigation and complete obturation of root canals which in turn brings about a great decrease in root canal therapy failure and root canal treatment fear among patients. Dental caries remains the primary reason for seeking endodontic treatment. This is so despite the evident decline in caries incidence\textsuperscript{2, 3, 4}. Trauma, failed restorations and iatrogenic factors forms other reasons for seeking endodontic treatment in the population.

OBJECTIVE
To determine retrospectively the indications for root canal therapy and the proportion of root treated and retreated teeth at the University of Nairobi Dental Hospital between 2004 and 2009.

STUDY DESIGN: A retrospective descriptive cross-sectional study.

STUDY AREA: University of Nairobi Dental Hospital.

STUDY POPULATION: Clinical records of patients who underwent root canal therapy from July 2004 to July 2009.

MATERIALS AND METHODS
Patients’ clinical records were manually assessed to retrieve the necessary information. A convenient random sampling procedure was carried out and a data collection form (check list) used to record the data. The data was analyzed using SSPS version 13.0 and Microsoft Excel.
RESULTS:

A total of 280 clinical records of patients that underwent root canal therapy at the University of Nairobi Dental Hospital between July 2004 and July 2009 were recorded. Out of these, 154 (55%) were male and 126 (45%) were female. The patients' ages ranged from 15 to 75 years, the majority being in the 25-34 years age group. Out of the total root treated teeth, (188) 67.25% were in the maxilla and (92) 32.75% were in the mandible. Out of the 280 teeth in the study, 71 (25.4%) were anterior teeth. Posterior teeth accounted for 189 (74.6%), out of which 111 (39.6%) were molars. The indications for root canal therapy included dental caries, trauma, failed tooth restorations, previously unfavorable root canal therapy, iatrogenic chemical or thermal damage to the pulp, advanced periodontal diseases, for prosthetic reasons and others. Dental caries was the main indication for root canal therapy 149 (53.2%) of all cases, followed by failed dental restorations (16.8%) and traumatic exposure of the pulp (11%). Out of the 280 teeth that underwent root canal treatment, 28 (10%) teeth were retreated. Upper first molars were the most common retreated teeth accounting for 21.4% (6 teeth) of the retreatment cases. They were followed by lower first molars (4 teeth), lower second molars (4 teeth) and lower second premolars (4 teeth) accounting for 14.28% each.

CONCLUSION:

An analysis of clinical records of 280 patients that underwent root canal therapy revealed that dental caries was the most common indication for root canal therapy. This was followed by failed dental restorations, traumatic exposure of the pulp and previously failed root canal therapy. This study revealed a high rate of molar endodontics. Posterior teeth accounted for 74.6% of all root treated teeth while 25.4% were anterior teeth. More men than women underwent root canal therapy. The 25-34 years age group had the highest number of caries induced root canal treatments which declined with age. Trauma as an indication for root canal treatment had the highest frequency in the 25-34 years age group followed by the 15-24 years age group. Retreatment after caries induced root canal therapy was the most common finding. Teeth that underwent root canal treatments as a result of trauma, advanced periodontal disease and for prosthetic reasons were not retreated.
RECOMMENDATIONS:

There is need for clinicians to improve on their skills in carrying out the root canal therapy procedure. This will lead to a raised technical standard and quality of endodontic therapy in the country as well as decrease the high incidence of root canal treatment failures and subsequent retreatment.

Patient awareness and education programmes should include more information on conservative treatment aimed at increasing the proportion of root canals therapy carried out in the country and preventing tooth loss from extractions of affected teeth.

A wider study should be carried out to determine the indications of root canal therapy which are representative of the general population.
CHAPTER 1: INTRODUCTION

Root canal therapy, also known as root canal treatment, has become a standard component of dental therapy today. It is part of the wide treatment scope of endodontic therapy, a specialized branch of dentistry. It can be performed on any tooth of the dental arch and is the treatment done on pulp tissue that is damaged. It involves the complete removal of blood vessels, nerve tissue and cellular elements from the pulp, with subsequent cleaning, shaping and decontamination of the pulp space followed by obturation with inert filling material. The main objective of root canal treatment is elimination of infection and protection of the decontaminated tooth from future microbial invasion.

Under normal physiological conditions, the pulp is well protected from injurious elements in the oral cavity by the hard tissues of the tooth and an intact periodontium. When the integrity of these tissues is breached, microorganisms and the substances they produce may gain access to the pulp and infect it. The pulp responds to this in many ways, one of which is inflammation; a condition known as pulpitis. Pulpitis may be reversible, where the pulp tissue heals on its own, hence reversing the damage, or irreversible pulpitis, where nerve tissue of the tooth is considered vital but not viable because infection has extended to the vicinity of the pulp. In these cases, the pulp’s response may take a destructive course resulting in severe pain and necrosis (death of the pulpal tissue). The treatment of the necrotic pulp is by root canal therapy.

The most common microbial challenge of the pulp derives from dental caries. Caries of dentine, root caries and recurrent caries associated with marginal leakage of restorations allow bacteria to access the pulp, infect it and cause pulpitis. Pulpitis may also be caused by microorganisms reaching the pulp via other routes. These may be as a result of tooth wear, fractured teeth due to trauma, root resorption, root planing and conditions with defective enamel and dentine, for example, odontomes. In advanced periodontal disease, bacteria in deep pockets may gain access to the pulp via periapical tissues, accessory root canals or exposed dentinal tubules. Iatrogenic factors like
thermal or chemical injury to the pulp during cavity prep or by irritant dental materials are another cause of pulpitis.

The rate of progression of pulpal inflammation is variable. However, the end result of untreated pulpitis is total pulp necrosis which constitutes a major indication for root canal therapy.

Various studies have found a relationship between root canal therapy and age of a patient, sex of a patient, type of tooth in the dentition, periapical status and technical quality of the treatment. The aim of this study is to determine the indications and reasons for root canal therapy on different teeth in the permanent dentition. Pulpal disease is a significant problem in Kenya and information regarding root canal therapy could serve as a pointer to this disease as a national health problem. The findings of this study can assist in production of better quality of root canal therapy, better management of diseased teeth and improved patient motivation.
CHAPTER 2

2.1: LITERATURE REVIEW

In a cross sectional study of patients aged 17 years and above, carried out in a Nigerian teaching hospital, it was observed that out of 323 teeth indicated for endodontic treatment, 102 teeth (31.6%) were anterior teeth, 41 teeth (43.7%) were premolars and 8 teeth (24.8%) were molars.

The indications for endodontic treatment were dental caries, trauma, failed restorations, tooth wear, periodontal disease and any combination of these factors.

Caries was the most common reason for endodontic treatment (50.2%) followed by trauma (20.7%), while failed restorations accounted for (16.1%). Trauma was the commonest reason for endodontic treatment among anterior teeth while dental caries was the commonest reason in posterior teeth. In conclusion, it was found that dental caries was the most common reason for endodontic treatment, followed by traumatic exposure of the pulp.

Premolars were the most treated teeth followed by incisors, canines and molars.

A study to determine the etiology and symptoms of endodontic cases treated in a University clinic in Saudi Arabia found that the major reason for endodontic treatment was caries (52.6% of total patients). Trauma was also shown as a major cause for high demand for endodontic therapy with 17.4% of total patients being indicated for root canal therapy.

It was found that caries as a cause of endodontic treatment was more common in lower molars than any other tooth type, followed by upper anteriors. Upper anteriors were the most affected by trauma.

The study concluded that the 15-24 age group had the highest number of caries induced endodontic treatment (37.5%) with trauma as a reason for endodontic treatment accounting for (48.9%) in this age group. These figures declined with age.

There were no gender differences in the distribution of pulpal disease in the population studied.

A study conducted in a group of Jordanian population observed that, out of 1,404 root canal treated teeth, 77.7% of the treated teeth were in the maxilla and 22.3% were mandibular teeth. Posterior teeth accounted for 39% of all root treated teeth, out which 20.3% were molars. The
maxillary central incisor was the most frequently treated tooth (39.6%), followed by the maxillary lateral incisor (10.1%). The maxillary third molar was the third most frequently treated tooth (8.2%), followed by the mandibular first molar at 7.5%. The lowest frequency of treatment was for mandibular lateral incisors and canines which made up 3.0% in total. This study revealed a lower percentage of molar endodontics than in previous studies.

A cross sectional study of teeth in a Brazilian adult population 11 showed that of the 29,467 evaluated teeth, 21.4% had been endodontically treated. Maxillary premolars and molars were the teeth in which endodontic treatment was most frequent whereas mandibular incisors showed the lowest prevalence. These findings were consistent with those of Lupi- Pegurier et al 14 and Kirkevang et al 15.

In a study to evaluate the current technical quality of root canal treatments in Taiwan 1, good quality endodontic work (GQEW) was defined as having both adequate filling length and complete obturation. Anterior teeth with GQEW accounted for 40.4% and premolars with GQEW accounted for 33.0%. These figures were significantly higher than those in molars (18.4%).

It was concluded that approximately 70% of the teeth receiving root canal treatment in Taiwan were either inadequately filled or incompletely obturated, suggesting that the technical standard of root canal treatment is not satisfactory in Taiwan.

In a study to examine the prevalence and technical quality of root fillings, and the periapical status of endodontically treated teeth in a French subpopulation 21, full mouth periapical radiographs were obtained from 208 consecutive adult patients seeking dental care. The technical quality of root fillings was assessed according to the position and density of the obturation. Periapical status was evaluated using the Periapical Index Scoring System.

Of the 8,743 roots included in the study, 23% were root filled. An acceptable standard of treatment was found in 21% of roots with 16% of these cases associated with signs of periapical disease. Of the roots with unacceptable root fillings the, 27% had periapical pathology. The results demonstrated poor technical quality of treatment despite a high prevalence of root treated teeth.
A study to determine the prevalence and technical standard of root canal treatment as well as the prevalence of apical periodontitis in Belgium\textsuperscript{22} indicated that the endodontic treatment need of the subpopulation was great and the technical standard of root canal treatment was disappointing. Panoramic radiographs of 206 Belgium adults attending the Dental School of the University Hospital of Gent were examined for endodontic treatment, periapical conditions and coronal restorations. Out of the 4,617 teeth examined, 6.8\% were endodontically treated. Periapical radiolucencies were found in 6.6\% of all teeth and in 40.4\% of all the endodontically treated teeth.

More than half of the root filled teeth (56.7\%) were scored as inadequate on the basis of a criterion evaluating the level of the root end filling.

An epidemiological study evaluating endodontic treatment outcomes in a large patient population in the USA\textsuperscript{23}, found that 97\% of the 1,462,936 teeth evaluated were retained in the oral cavity for up to eight years after nonsurgical endodontic treatment. Incidences of retreatment, apical surgeries and extractions comprised 3\% of the cases and occurred mostly within three years from completion of treatment.

Results of a study evaluating endodontic treatments performed by students in a Brazilian dental school\textsuperscript{12} indicated that dental caries and its after effects were responsible for majority of root canal therapy (78.8\%). This is consistent with the findings of Serene and Spolsky\textsuperscript{16}. Prosthetic reasons (8.8\%) and failure of endodontic treatment (12.4\%) were also significant.

More maxillary (56.1\%) than mandibular teeth (43.9\%) were endodontically treated. However, lower molars were more involved than upper molars; their percentage being 22.9\% compared to upper molars (12.1\%). Upper incisors formed the second largest group of endodontically treated teeth (22.4\%). These findings were consistent with those of Seltzer et al\textsuperscript{17} as well as Serene and Spolsky\textsuperscript{16}.

There were 162 (31.8\%) primary treatment cases with radiographic signs of periapical lesions. These teeth had necrotic pulp tissues. Periapical radiolucency was present in 15 (21.1\%) of the cases that exhibited failure of endodontic treatment (17). These findings were consistent with Boucher et al\textsuperscript{18}.
Emphasis was also placed on the quality of the coronal restoration and its relation to the periapical status in root filled teeth. It has been suggested that the coronal restoration and the root filling serve as barriers against fluid and bacterial penetration into the periapical area.  According to a 1995 study of 1,010 endodontically treated teeth by Ray and Trope, the technical quality of a coronal restoration was significantly more important than the technical quality of the endodontic treatment, for apical periodontal health. Therefore, the main restorative material used at the time of that study was resin composites to prevent coronal microleakage and to increase the chances of healing.

A study assessing endodontic treatment needs of the elderly in 66 year old residents of the city of Zurich using intraoral radiographs showed that, of the 143 volunteers having a total of 2004 natural teeth, 78% had one endodontically treated tooth. 20% of all teeth were root filled, two thirds of them being in the upper jaw. 64% of the root fillings were judged insufficient and 8.5% of all teeth showed periapical radiolucencies. Most of the latter (73%) were associated with insufficient root canal therapy. 99% of the root filled teeth had intracanal retentive devices. 52% of the teeth with insufficient root fillings were judged not to need revision, 37% needed revision, 9% needed apicectomy and 2% were ready for extraction.