INDICATIONS FOR INITIAL AND REPLACEMENT OF AMALGAM AND COMPOSITE RESTORATIONS AMONG PATIENTS AT THE UNIVERSITY OF NAIROBI DENTAL HOSPITAL.

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### LIST OF ABBREVIATIONS

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<tr>
<td>BDS</td>
<td>Bachelor of Dental Surgery</td>
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<tr>
<td>UoN</td>
<td>University Of Nairobi</td>
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<td>UONDH</td>
<td>University of Nairobi Dental Hospital.</td>
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ABSTRACT
Dental caries is a disease of dental hard tissue affecting majority of the population and as a result patients seek dental health care. The two materials commonly used in restorative dentistry are amalgam and composite. Amalgam constitutes a large proportion of the dentists’ daily routine care. It has been established to be the commonest material for dental restoration although there had been proposal to eliminate its use as a restorative material in some countries. The popularity of tooth coloured posterior restorations has increased during recent years because of a growing demand for aesthetics and concern about biocompatibility of amalgam.

The main objective of this study is to determine the indications for placement and replacement of amalgam and composite restorations. A descriptive cross sectional study will be conducted at the conservative clinic at the University of Nairobi Dental Hospital. The study will include 362 patients presenting to the conservation clinic, who are 18 years and above and require permanent fillings (Amalgam and composite). A convenience sampling method will be used. All patients reporting to the conservation clinic during the period of study and meet the inclusion criteria will be recruited. Data will be collected using clinical examination forms, analysed using SPSS and presented in form of tables and charts.

The results will identify the factors or oral conditions necessitating restorations and hence recommendations will be made to provide valuable insight into patterns of provision of dental care and highlight research priorities in relation to direct restorations.
INTRODUCTION

Dental restorations constitute a large proportion of the dentists’ daily routine patient care. The two materials commonly used in restorative dentistry are amalgam and composite.\(^1\) Patients receive varying types of restorations for management of various dental diseases and conditions. These include dental caries, marginal fracture, tooth fracture, unsightly appearance, poor anatomic form of tooth, overhang and marginal ditching. Studies done in a military population in Canada revealed that (90% and 10%) of restorations placed were due to caries and non-carious defect respectively.\(^2\)

Amalgam restorations have long been established as the commonest material for posterior dental restorations because of ease of manipulation, superior mechanical properties, good clinical performance, durability and relatively low cost. Studies done in Sweden and Nigeria in the year 2002 showed that amalgam remained the commonest restorative material in use (68% and 75%) respectively. Moreover amalgam restorations account for 75% – 80% of all single tooth fillings, in about 200 million North Americans.\(^4\) Amalgam was most often placed in class I and II situations, (88.9%) of the amalgam restorations reported.\(^5\)

On the other hand composite is a tooth coloured restorative material comprising a combination of polymer and ceramics. The major components are: Organic resin matrix, inorganic fillers and coupling agents. Due to the potential biohazardous nature of amalgam, composites tend to supersede amalgam use in the western world.\(^4\) Composite was most often placed in class III, IV and V situations (77.4 %) of the composite restoration reported.\(^5\)

Indications of an initial restoration include: primary caries, tooth fracture, discoloration and poor anatomic form of the tooth.\(^3\) Reasons for initial placement of amalgam and composite restorations have been established by several reports. It was revealed that primary caries had been consistently found to be the principle reason for the provision of initial restoration of amalgam and composite with the ratio ranging from 1:1.1 – 1:2.4 to 1:1.1- 1:3.8 respectively.\(^6\)
A replacement restoration is indicated during secondary caries, recurrent caries, marginal failure, marginal discoloration and loss of filling. A study showed that secondary caries was the most common reason for replacement (36% and 41%) in composite and amalgam respectively. The main reason for replacement of all types of restorations was secondary caries followed by fracture of restorations especially bulk fracture irrespective of patient age.

Clinical practices are deeply affected by subjective evaluation of longevity and of longevity prognoses. Restoration longevity is closely related to the decision to replace a restoration and consequently to the way that a clinician identifies and uses concepts about restoration failure. According to numerous studies the longevity of composite restoration appeared to be lower than for amalgam, six and nine years respectively. Inadequate operator technique and poor patient compliance are contributing factors for restoration failure. Research regarding enamel and dentine bonding systems is intended to produce better quality and durable results for composite restorations. A study revealed the longevity for amalgam and composite as 10 and 5 years respectively. Subjective appraisal indicated a 50% failure range between 6.5 and 11.2 years for amalgam; an estimate useful to compare with the actual longevity's reported such as 11.5 years.

The aim of the study therefore is to determine the reason for first time placement and replacement of both composites and amalgam restoration.
LITERATURE REVIEW

Dental amalgam was the world wide, all round material of choice for posterior restorations in primary and permanent teeth until 2 decades ago. However changes have occurred for several reasons. The development of alternative tooth coloured restorative materials as well as controversy over the potential side effects of amalgam has had an influence on the selection of restorative materials.

Evidently criteria for diagnosis of failed restorations are ill defined, subjective and or variable. Restoration replacement is a major component comprising about 88% of dental practice in particular for adults. Clinicians have reported reasons for restoration replacement as secondary caries (52%), bulk fracture (20%), tooth fracture (18%) and marginal degradation (10%). In spite of considerable variations, secondary caries (60%) was given as the main reason for restoration replacement. 13

A study done reviewed the prevalence of caries, main cause of restoration failure and replacement. It then focussed on secondary caries, its histopathology, aetiology, difficulties in diagnosis, prevention and remineralization possibilities. The study findings were that although secondary caries was still the main reason for restoration replacement, the development of new technologies for detecting and monitoring these lesions at an early stage would allow for testing of new interventions to arrest or remineralize these lesions would delay the need for restoration. 14

Reasons for failure include different concepts put together according to the judgement of a given clinician (Boyd). As a general rule no distinction has been made between restoration shortcomings, which have been built into the restoration since it was placed, and shortcomings in contact with the oral environment. 10

A study done on 2,239 composite restorations from patients aged 12-65 years revealed 34.8% replacement restorations . The main reason for replacement was secondary caries 36.2% followed by root canal therapy 22.2%, discolouration 14.4%, lost restorations 13.4%, composite fracture 11.3%, and pain or sensitivity 2.4%. 15
Reasons for placing restorations comprised replacement of failed restorations (47.2%), primary caries (45.3%) and non-carious defects (7.5%). Secondary caries was the main reason for replacement for all types of restorations. Chi-square analysis related to the dependence between the reasons for replacement and clinicians' experience showed that more experienced clinicians recorded a lower frequency of secondary caries than less experienced ones (P < 0.0001), while the diagnosis of restorations increased with the clinicians' experience (p < 0.0001).

A survey of amalgam restorations in a South Western Nigerian population assessed the proportion of replacement restorations in comparison with new restorations because of primary caries in a setting where the caries experience had been reported to be low but probably on the increase. A total of 488 amalgams were surveyed. About 25% of all restorations were replacements of failed restorations. The main reason for replacement was bulk amalgam fracture (51%). These showed a reversal of what had been reported in settings where the caries experience was high but is now on the decrease.

Decisions at a USA and UK dental school studied repair and replacement of amalgam restorations. Reasons sited the most to replace was secondary caries including unsightly appearance, partially lost restoration and tooth fracture; loss of part of restoration and marginal ditching.

Findings where 27 clinicians placed 2,035 restorations, 53% were replacement of failed restorations. The increased use of resin-based restorative material was clearly evident including posterior composites. The clinical diagnosis—secondary caries was the most common reason for replacement of amalgam (56%) and composite (59%) restorations. The median age of the replaced amalgam restoration was 15 years and of composite restoration was 8 years.

A study done on composite restorations revealed 61.6% initial placement of restorations. The major reason was primary caries.

A survey in order to ascertain the reason for placement and replacement of amalgam and composite restorations was done. Consent was made with the Italian Academy of
Conservative Dentistry. Sixty-two dentists answered the questionnaires analysing their daily restorative work for two weeks: a total of 2960 restorations were scored. The results showed a prevalence of the primary caries over the replacement. Both data indicated the need for a more preventive approach to dental caries in Italy, even if the results fit fairly well into the values of the international research.\textsuperscript{19}

The treatment decision to “monitor” the restoration was more frequent for the Manchester site than the Florida site. Conversely the combined decision to “refurbish” repair and replace were more frequently chosen in Florida than in Manchester.\textsuperscript{17}
RESEARCH PROBLEM

a) Problem Statement

There are various conditions that irreversibly affect dentine and enamel. In restorative work initial restorations are indicated in cases of dental caries, tooth discolouration and loss of anatomic form. Replacement restorations are indicated due to factors such as recurrent caries and material failure (marginal degradation, discolouration and bulk fracture). However failure of executed restorations is not a rare occurrence from the researchers own clinical examination in the oral diagnostic clinic and literature review. Dental caries is a widespread disease in the country necessitating dental restorations. Material failure and clinician techniques also being contributory factors.

b) Study Justification

There is little information regarding indications for placement and replacement of dental restorations among dental patients in the conservation clinic. Information from this study will serve as a benchmark to identify the factors influencing placement and replacement of amalgam and composite restoration and hence giving recommendations that aim to monitor treatment trends in contemporary clinical practice. Moreover the data can be used for research purposes as well as planning for oral health treatment.

c) Objectives

(I) Main Objective

• To determine the reasons for initial placement and replacement of amalgam and composite restorations.

(II) Specific objectives

• To determine the reasons for initial placement of amalgam and composite.

• To determine the reasons for replacement of amalgam and composite.
Hypothesis

1. Caries is the main reason for initial placement of amalgam and composite restorations.

Variables Investigated

1. Socio-demographic

   (i) Age

   (ii) Sex

2. Independent Variables

   (i) Initial caries

   (ii) Secondary caries

   (iii) Tooth fracture

   (iv) Poor anatomic form

   (v) Marginal ditching.

3. Dependent variables

   (i) Initial placement of amalgam and composite restoration.

   (ii) Replacement of amalgam and composite restorations
MATERIALS AND METHODS

Study Area

The study will be conducted at the conservation clinic at the UONDH. The hospital is located on Argwings Kodhek road. It serves the whole of the city of Nairobi and acts as a national referral centre for oral and maxillofacial conditions. This is where undergraduate dental students and postgraduate students in paediatric dentistry and Oral and Maxillofacial surgery are trained. It consists of the following clinics: - Oral diagnosis, Prosthetics, Conservation, Periodontology, Orthodontics and paedodontics. Undergraduate and postgraduate students under supervision of consultants offer treatment. Consultants also offer treatment. On average sixty patients are attended to daily.

Study Population

The study will include all patients presenting to the conservation clinic at the UONDH and who are 18 years and above. Only patients receiving amalgam and composite permanent fillings will be included in the study.

Study Design

This will be a cross sectional descriptive study.

Sample size Determination

\[ N = \frac{Z^2P(1-P)}{C_2} \]

- \( N \) = Sample size
- \( P \) = Prevalence (assumed to be 61.6\%)\(^{15} \)
- Confidences is 95%
• \( Z = Z \) value is 1.96

• \( C = 1 \) – confidence level.

\[
N = (1.96)^2 \times 0.62 (1-0.62)
\]

\[
(1-0.95)^2
\]

\[ N = 362 \]

**Sampling**

A convenience sampling method will be used. All patients aged 18 years and above reporting to the conservation clinic either in the morning or afternoon session during the period of study will be recruited to participate in the study.

**DATA COLLECTION, INSTRUMENTS AND TECHNIQUES**

Research assistants will be trained and data collected using clinical examination forms.

**Inclusion Criteria**

All patients visiting the conservation clinic at the UONDH who are 18 years and above and require permanent fillings (amalgam and composite).

**Exclusion Criteria**

i) Patients requiring fillings other than amalgam and composite.

ii) Patients who will not consent to the study.

iii) Patients below 18 years of age.

**Ethical Consideration**

The proposal will be submitted to the Kenyatta National Hospital/University of Nairobi ethics and research committee. Permission to conduct the study will be sought from the relevant authorities. Informed verbal consents will be obtained. Failure to consent will
not affect patients’ treatment and confidentiality of the information given will be assured. The information will be used to provide valuable insight into patterns of provision of dental care and highlight research priorities in relation to direct restorations.

Logistical Consideration

(i) Financial constraints: cost of typing and photocopying are high considering the interviewer is a student with no income apart from pocket money, which is geared, towards my upkeep.

(ii) Limited time of study: The study will be conducted in a busy academic schedule that includes many continuous assessment tests and clinical sessions that are physically exhausting.

Proposed Benefits

1. The information obtained from this study will be used for planning of oral treatment to counter the highest cause of initial placement and replacement of restorations.

2. The information obtained will also be used in planning of oral health education programmes to counter the highest cause of initial placement and replacement of restorations.

3. The report will be submitted for partial fulfilment of the requirements of Bachelor of Dental Surgery.

Data Analysis

Data will be analysed using SPSS 12.0. Frequencies will be used to assess the data. Statistics will be computed and presented in form of tables and graphs.
BUDGET

1. Proposal Writing

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GRAND TOTAL  7056
REFERENCES:


CONSENT FORM

The purpose of the study
Alubale Elizabeth Bitea a level III BDS student is carrying this study. The questionnaire will cover two commonly used dental restorative materials, AMALGAM and COMPOSITE. The aim of this study is to determine the reason for initial placement and replacement of amalgam and composite restorations among patients at the UONDH. The study will be of importance since placement of restoration is becoming increasingly common in daily routine patient care. On the other hand failed restorations are not a rare occurrence. The data collected is hoped to be used in formulating appropriate methods that can be drawn up so as to insight into the impaction patient care and treatment philosophies.

Voluntary participation
I understand that I have entered the study voluntarily and that I can terminate my participation in the study without any consequences. The participation in the study doesn’t entail financial benefit.

Anticipated risk
No risk is anticipated for participating in the study.

Confidentiality
Permission to obtain research information will be sought from the patient. Failure to consent will not affect patient’s treatment and confidentiality. The information given to the researcher will be kept in strict confidence. No information, by which your identity can be revealed, will be released or published.

I the undersigned -------------------------------------------- do hereby will fully give consent to participate in the study.

Sign-----------------------------------------------
Appendix 1: CLINICAL EXAMINATION FORM

READ THE QUESTIONS CAREFULLY AND ENSURE YOU UNDERSTAND THEM BEFORE ENTERING THE APPROPRIATE RESPONSE IN THE BOX PROVIDED.

To use one questionnaire per person per tooth.

Op/No.: __________________________________________
Sex: ____________________________________________
Age: ____________________________________________
Occupation: ______________________________________
Level of Education: ________________________________

1. Is the restoration?
   □ Initial Placement
   □ Replacement

2. According to G.V. Black’s classification, how would you classify the cavity?
   □ Class I
   □ Class II
   □ Class III
   □ Class IV
   □ Class V
3. What are the reasons for placement/replacement of restorations with regards to answer No.1?

- [] Fractured amalgam
- [] Peri-apical pathology
- [] Primary caries
- [] Secondary Caries
- [] Tooth fracture
- [] Total loss of filling
- [] Leaking margins with symptoms
- [] High spot
- [] Pain after filling
- [] Sensitivity after filling
- [] Others specify ______________________

4. If initial filling how do you intend to manage the problem?

- [] Amalgam filling
- [] Composite filling
- [] RCT
- [] Others, specify) ______________________

5. If replacement, what type of material was used before?
☐ Amalgam
☐ Composite
☐ Others, specify ________________________________

6. How do you intend to manage the problem?

☐ Amalgam filling
☐ Composite filling
☐ Tooth extraction
☐ RCT
☐ Others (specify) ________________________________

7. If replacement restoration, how long has the previous filling been there?

☐ <6 months
☐ 6 months to 11 years
☐ 5 years

8. Where did the patient have the restoration done?

☐ Private
☐ Dental school
☐ Public
☐ Others (specify) ________________________________
9. What was the size of the filling relative to tooth size?

☐ Small
☐ Medium
☐ Large

10. Did the patient receive dental health education at the time of initial placement of restoration?

☐ Yes
☐ No
☐ Others (specify) ________________________________

11. If yes (in No.10) did the patient comply with the dental health education provided?

☐ Yes
☐ No

13. In the failed amalgam/composite do you think the cavity prepared followed the conventional GV black criteria?

☐ Yes
☐ No

14. Comment on the cavity preparation?
Thank you so much for your cooperation.

ALUABLE .E.B
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