UNIVERSITY of RWANDA

College of Medicine and Health Sciences

School of Health Sciences

REDUCING TOOTH EXTRACTIONS CASES AT REMERA RUKOMA DH, DENTAL CLINIC.

A capstone dissertation submitted and presented in partial fulfillment of requirements for Master's degree in Hospital and Healthcare Administration (MHA)

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DECLARATION

This capstone dissertation entitled "**Reducing tooth extractions cases at Remera Rukoma dental clinic**" is submitted in partial fulfillment of the requirements for College of Medicine and Health Sciences, University of Rwanda, Degree of Masters in Hospital and HealthCare Administration

Supervisor's Declaration

To the best of my knowledge, I certify that: The study was completed and the dissertation was written under my direction.

The research was done in compliance with the degree requirements.

The candidate's original work is shown in the capstone dissertation.

My participation to the study, together with those of the other members of the supervisory team, other university staff members, and others, was consistent with standard supervisory procedure.

External research contributions are recognized

Supervisor, _____ Date _____

Candidate's Declaration

This capstone dissertation is my own work

My supervisors' and others' contributions to the research and the capstone dissertation were compatible with accepted supervisory procedures.

External research contributions are recognized

Candidate _____ Date _____

DEDICATION

I dedicate my dissertation work to my family and friends. A special feeling of gratitude to my lovely wife IRADUKUNDA Joy, deserves a particular note of thanks for her words of support and prodding me to perseverance. In addition, I honor my daughters ADUHIRE KASIGAZI MPETA Amaris and DUSENGE NKUSI ITUZE Iris with this dissertation for their tenacity throughout the MHA program. I dedicate this work to the REMERA RUKOMA DH dentistry team and the hospital's quality improvement team for their significant contributions to the dissertation process.

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Last but not least, I would want to express my gratitude to my wife, kids, extended family, and countless friends who supported and loved me unconditionally during this protracted study process.

Be fortunate.

ABSTRACT

1.Background

The teeth extraction rate is increasing globally, the common causes of teeth extraction include dental caries, eruption problems, periodontal diseases, orthodontic treatments and accidents, In Remera Rukoma DH most of the patients coming for dental services end up getting their teeth extracted because they come at the latest stage when the possible treatment is teeth extraction, yet no intervention has been conducted there to decrease such high rate. The rate of tooth extraction at Remera_Rukoma district Hospital, dental clinic from January to June 2021 were 90% in Remera Rukoma dh/dental clinic; this problem has been evidential during daily dental activities and data reviewed in that period.

2.Methods

In the current dissertation, which sought to lower the rate of tooth extraction cases, a pre and post intervention design was used. Baseline data on the size of the issue served as the basis for conducting root cause analyses, which identified alternative solutions that were then compared before interventions were chosen. Using SPSS, the chi-square test was utilized for the analysis.

3.Root cause

The main root cause identified include: lack of sufficient knowledge /skills on oral hygiene practice by patients and provision of oral hygiene /oral health education by health care providers of health centers under Remera Rukoma DH and delay in transferring dental patients

4.Objective

To decrease tooth extraction rate at Remera- Rukoma District Dental Clinic from 90% to 40 % from October 2022 to April 2023.

5.RESULTS

During the period of six months (from October 2022 to march 2023) of intervention the rate of teeth extraction has decreased form 90% in pre_intervention to 67% after intervention. The oral health education by health care providers has increased from 2% to 81% P-value =0.002 which is statistically significant, increase of the recommended frequency of brushing among the participants from 31% to 49% and it is also significant change with p value =0.002 which less than 0.005, consequently there is an increase from 1.4% to 15.6% in restorative treatment provision with p value = 0.002 therefore it's a significant change statistically.

6.CONCLUSION AND RECOMMENDATION

The oral health education we conducted in this study helped to reduce the rate of teeth from 90% to 67%, Though we did not achieve the objective due to time period, we found that the compliance to the oral health education provision and oral hygiene practices together with earlier transfer of dental patients to the hospital decreased the rate of teeth extraction practices therefore the null hypothesis is rejected, We recommend for a longitudinal study for teeth extraction rate at RR DH after a certain period of time.

Key words: Teeth extractions, tooth loss, prevention of dental caries, effect of dental caries

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Acronyms and Abbreviations

HMIS: Health Management Information System

EPR: Eglise Presbyterienne au Rwanda

IEC: Information Education and Communication

MHA: Master of Hospital and Health care Administration

OHE: Oral Health Education

QI: Quality Improvement

RR DH: Remera Rukoma District Hospital

SPSS: Statistical Package for the Social Sciences

WHO: World Health Organization

Definition of key terms

Oral health education: Oral health education focuses on increasing awareness and encouraging individuals to adopt healthy habits that can improve their overall and clinical oral health.(1)

Restorative dental treatment: simply, restorative dentistry involves any dental process which focuses on repairing or restoring damaged oral structures(2)

Teeth extraction: is the process of removing a tooth from its socket in the gum. (3)

Health education: is the art and science of assisting individuals in making lifestyle changes to progress toward a state of optimal health. It is defined as the process of providing oral health information to people in a way that they can apply the concepts to everyday living. (4)

Implementation: the act of carrying out a judgment or plan; execution.(5,6)

Health Behavior change: refers to the processes of adopting and sustaining health-enhancing behaviors in place of such health-compromising habits that are motivated, voluntary, and action-based.(7)

CHAPTER ONE: INTRODUCTION

1. Background

Dental caries was the primary reason of tooth extractions (39.3%), followed by eruption problems (23.5%) and periodontal diseases (19.8%) in Turkish and again Caries and its sequelae were the major reasons for missing teeth as well as for current extractions in Northern _Eastern Nigeria (8)The high rate of tooth extraction at Remera_Rukoma district Hospital, dental clinic from January to June 2021 were 90% in Remera Rukoma dh/dental clinic; this problem has been evidential during daily dental activities. When we discovered that a large number of patients attending dental clinic had teeth at the stage where tooth extraction is the only treatment option indicated, this result in performing many extractions in our patients rather than doing other conservative treatment of teeth (restoration of teeth), this study aimed to decrease tooth extraction rate at Remera- Rukoma District Dental Clinic from 90 % to 40 % from October 2022 to March in 6 months period from October 2022 to march 2023 by implementing an effective interventions.

Remera Rukoma District Hospital is located in Southern province, Kamonyi District, Rukoma Sector and Taba Cell approximately at 30 km from Kigali City. It is managed by Presbyterian Church (EPR) and was built it in 1927. By the time it started, it was infirmary, it had nutritional service, which become Dispensary. It becomes hospital in 1978 by Sister Karara, new buildings for maternity, clinic, pediatric, internal medicine, the offices of Director General, office of director of administration and the office of director of nursing and midwifery, the Director of Medical and allied health, laboratory and emergency had been built. Remera Rukoma hospital is currently served by 157 staff with Doctors, Midwives, nurses, allied health professionals and non-clinical staff. The hospital receives patients from 13 health centers located in different Sectors across the district and it serves more than 265,000 Population(9).

The dental department is supported by OHFR (Oral Health Foundation Rwanda) and receive 160 patients on average by month from the catchment areas under Remera Rukoma District hospital that in providing dental treatment to disadvantaged.

At Remera Rukoma DH-Dental Clinic; Tooth extraction rate was 90%, this problem was observed during daily dental activities.

2. Definition of the problem

There is high rate of tooth extraction at Remera_Rukoma district Hospital, dental clinic. Tooth extraction is defined as the painless removal of a whole tooth or tooth root with minimal trauma to the investing tissues, so that the bone heals without issue and no postoperative prosthetic problem is created. It is done with the aid of anesthesia(10)Among Pakistani underwent teeth extraction change in lower lip protrusion after extraction treatment were observed as consequence of teeth extraction(11) However, restoring tooth is associated with several benefits including preserving the facial appearances.

In Remera Rukoma, through retrospective data collected from January to June 2021 in HMIS and in patient register, Tooth extraction rate was 90% in Remera Rukoma DH-Dental Clinic; this problem was observed during daily dental activities.

We discovered that a large number of patients attending dental clinic had teeth at the stage where tooth extraction is the only treatment option indicated, this result in performing many extractions in our patients rather than doing other conservative treatment of teeth (restoration of teeth) it has also been revealed in different monthly reports generated that tooth extraction is a major procedure done in patients attending Remera Rukoma District Hospital/dental clinic, taking an example of reports from January to June/2021, it shows that extractions constitute 90 % compared to other procedures which make 10%(here include transferred cases, permanent filling, those who got medication only, incision, excision, curettage and those who got counselling).

Table 1: Presentation of teeth extraction practices and the number of other procedures per month from January 2021 to June 2021.

Through analysis of data revised in Remera Rukoma District Hospital, we came up with the data presented in table 1. It was agreed by dentists together with Hospital Director General and Director of Finance and Administration that it is a problem as it affect the community under the catchment area of Remera Rukoma DH. The Hospital of Remera Rukoma understand that 90% of teeth extractions is a problem.

No	Month/year	Tooth extraction performed per month	Other procedures performed	Total cases
1	January/2021	149	21	170
2	February/2021	221	15	236
3	March/2021	168	17	185
4	April/2021	230	26	256
5	May/2021	144	19	163
6	June/2021	167	7	174
	Total	**1.079**	**105**	**1184**

Source: HMIS_ Remera Rukoma District Hospital, 2021.

It was observable in baseline data that tooth extraction cases were prevalent (1.079) in number than other conservative treatments (105).

3. Objective

To decrease the rate of tooth extraction cases at Remera- Rukoma District Dental Clinic from 90% to 40 % from October 2022 to March 2023.

4. Hypothesis

Ho: The rate of tooth extraction procedures won't go down even if dental patients are sent to hospitals early and oral health education and cleanliness guidelines are followed.

Ha: The rate of tooth extraction procedures will decrease when oral health education is adhered to, oral hygiene habits are followed, and dental patients are sent to hospitals earlier.

5. Justification of the project

Despite the consequences of teeth extraction, its rate is very high at Remera Rukoma and there is a lack of intervention attempting to decreasing such rate. Therefore, this study contributed to its reduction. We expect the findings of this research to reduce the frequency of tooth extractions And will help patients to preserve their facial appearance and prevent other consequences that may arise from losing teeth. The study had shown that aesthetic restorative dental treatment has a positive effect on patients' self-esteem(12).And this study contributed to increase awareness in conservative dental treatment and oral hygiene practices, The primary risk factors for dental decay and those who required tooth extractions among the questioned kids were poor oral hygiene habits, a lack of parental guidance and proper dental health education, frequent exposure to cariogenic foods, and sociodemographic.(13) Also, this study contributed to early transfer of dental patients to RR DH district to prevent teeth extractions and all the consequences that follow teeth extractions.

6. Organization of dissertation

There are six primary chapters in this dissertation. The surroundings and history of the hospital are described in Chapter 1. The literature study is covered in Chapter 2, and the project's design is covered in Chapter 3. This chapter includes a mechanism for evaluating the success of the intervention as well as a thorough root cause investigation and the choice of action. Chapter 4 of the study's results contains its findings. Chapter 5 contains a thorough discussion based on the project's findings. Finally, chapter six also discusses the study's conclusions and suggestions.

CHAPTER TWO: LITERATURE REVIEW

0. Globally

Globally, according to a comprehensive assessment, 158 million persons globally, or 2.3% of the world's population, were edentate in 2010. The global age-standardized prevalence of severe tooth loss in the overall population fell between 1990 and 2010 from 4.4% to 2.4%, and the primary factor in this decline was the intervention made at the primary level of dental caries prevention.(14).Worldwide, Due to the significant prevalence of tooth loss in older people across the world and the fact that socioeconomic inequality is one of the primary causes of dental caries, among other factors, tooth loss in older people is considered a global health problem.(15)

2.1 Teeth extraction rate and causes among Asian countries

The study done in Yemen, reported that In Sana'a city, Yemen, dental caries and periodontal issues were the two leading reasons for tooth extraction.(16) and another study in North of Afghanistan reported that periodontal diseases were (35.3%) to reasons of teeth extraction and the most common reason for tooth extraction was caries (59.2%), surgical indications (4.9%) Up to the age of 50, tooth loss was mostly caused by dental caries. However, among those 51 years of age and beyond, periodontal disease became the main factor(17) again in France, the Overall, periodontal disorders (32.47%) and orthodontics (8.4%) were the most common reasons for extraction, followed by caries (49%). Dental caries accounted for the majority of extractions in the study's under-50 age group(18).

While in Iran, Tehran people between the ages of 41 and 60 experienced extraction at the greatest percentage (36.9%). Men made up 48.7% of patients, however they had more teeth pulled (55.3%) than women (43.9%). Nine hundred and thirty-six patients (67.7%) had just a low-level secondary education. Caries accounted for 51% of tooth loss, followed by periodontal disease at 14.4% and supernumerary and impaction teeth at 13.9%. Patient variables (age, gender, and educational attainment) and the number of teeth taken were significantly correlated (19)

In a subset of Saudi Arabia population, young ladies between the ages of 10 and 30 were found to have the greatest rate of extractions. Dental caries was shown to be the most prevalent reason for tooth extraction, accounting for 50.2% of cases, followed by orthodontic issues (18.2%), eruption issues (17.5%), and periodontal issues (8.2%).(20) whereas in the study done in Norway indicated

that smoking, being a man, and being older were substantially associated with tooth loss, and that 75% of teeth lost to periodontal disease had been given an unclear, dismal, or terrible initial prognosis(21).

While in Saudi Arabia in JIZAN, according to the research, individuals who were younger—between the ages of 20 and 29—had the highest rate of extractions. Caries was the leading cause of tooth extraction in the 20–29 age range (33.3%), followed by orthodontics, which was also a major factor in tooth extraction in the same age range. The most frequent reasons for tooth extraction in the age ranges of 40–49 and 50–59 years were periodontal disorders (37.5%). Periodontal disease and trauma were the least common causes in both men and women (22)

However, In Uruguay, the main cause of tooth loss in the young and adults is dental caries(23)while in Japan, for both sexes, periodontal disease accounted for the majority of tooth extractions (men: 40.4%; women: 34.9%). Men had tooth extractions due to caries 30.2% of the time, whereas women had them 29.0% of the time. 16.8% of tooth extractions in males and 19.2% in women were due to dental fracture.(24) In Singapore, according to the study's findings, caries and periodontal disease accounted for roughly the same amount of teeth extractions, or 35.8% and 35.4%, respectively (25). Another in Singapore Data on periodontal causes of tooth extractions was studied and was collected from 52 general dentists in Singapore. Out of 1276 patients' 2172 removed teeth, the findings showed. Caries caused 35.4% of the losses, whereas periodontal disease accounted for 35.8%. Age-related increases in periodontal extractions (26) In Kuwait, Caries was the primary reason for extraction in patients under 40 years old (60.7%), extractions for orthodontic and caries-related causes were more common in women, while extractions for periodontal disease were more common in men.(27)**.**

2.2 Teeth extraction rates and causes among European an American countries

In Sweden, the Dental caries, which was discovered in 60% of cases overall and at a greater incidence of 77%i in the oldest age group, was the main cause of tooth extraction(28), The study found that in 379 teeth were collected, of which 37% were taken largely because of caries, and 29% because of periodontal disease. Patients under 50 years old typically had their teeth out due to caries, whereas patients over 50 years old typically had their teeth removed due to periodontal disease. (29) In Brazil,70.3% percent of the 404 teeth removed were done so for dental caries and

periodontal disease, 6.4% for pre-prosthetic reasons, 3.7% for wisdom teeth, 2.5% for orthodontic needs, and 1.3% for trauma and patient request.(30)

While, In Greece, Throughout the research period, 2418 teeth were removed for a variety of causes. According to the findings, caries (45.6%), periodontal disease (32.1%), failed root canal therapy (7.3%), and root fracture (4.4%) were the primary causes of extraction. In patients under the age of 44, caries accounted for 64.7% of extractions, whereas periodontal disease accounted for 77.6% of extractions in patients beyond the age 45.(31),another study done in Scotland, the Dental cavities (51%) are the most common reason for extraction, followed by periodontal disease (21%), orthodontic treatment (11%), and unsuccessful endodontics (4%). In 7.5% of instances, patients sought extraction over alternative therapies, whereas trauma, pericoronitis, and other causes accounted for 5.5% of extractions. Between the ages of 31 and 60, periodontal disease accounted for a greater percentage of extractions.(32)while in western state of Germany, caries, periodontal reasons. 20% of all extractions were performed for dental caries, followed by periodontal illnesses (27.3%), caries and periodontal causes (18.7%), and prosthetic reasons (1.2%). Trauma accounts for 0.4%, orthodontics for 4.0%, and other causes for 2.9%. While periodontal illnesses and the combination of caries and periodontal diseases are more common than any other causes for the age groups beyond 40 or 45 years, dental caries is a key cause in all age groups.(33)

However, In Italy, Patients who needed tooth extractions cited pain (41.1%) as their primary cause, followed by mobility (22%), dental caries (15.9%), aesthetics (3.6%), economics (2.6%), trauma (1.4%), and aesthetics (3.6%), with 13.4% citing other factors. More than two-thirds of the teeth had dental caries (34.4%) and periodontal disease (33.1%) as the primary causes, followed by impaction (12%), orthodontic (7.2%), prosthesis (5.3%), patient request (2.2%), and trauma (1.3%), respectively.(34)the results look very in in the study conducted in Haryana; India found that 20.4% of children were losing teeth for a variety of causes. Caries was identified as the primary cause of extraction in 64.3% of cases.(35)

2.3 Teeth extraction rates and causes among EAC and African countries

In the Rural District Hospital in Northern Rwanda, the majority of patients (74.9%) also had chronic pulpitis in addition to dental caries, and virtually all patients (97.6%) had teeth extracted. (36) In Rwanda in the study conducted by the school of dentistry identified that the risk factors associated with dental caries are gender, dental visits and use of chew stick or miswaks(37) The

prevalence of dental caries at Gakoma district hospital was found to be at 71.5% among patients attending the outpatient department and predisposing risk factors were found to be old age, gender, poor oral hygiene resulting from inadequate knowledge on how to clean teeth regularly (38) While in Ethiopia, the prevalence of dental caries was high and increase with sweet food consumption was the most risk issue for dental caries in Ethiopia which results in many extraction(39) The main causes of tooth loss include the dental caries and periodontal disease in the study done in adults in south Sudanese(40)

While, In Mbale district in Uganda, the results revealed moderate prevalence of bleeding and tooth loss, high prevalence of calculus, low frequency of pockets 4-5 mm(41)

In Libya, according to the study, men were pulled more teeth than in women. The study found that periodontal disorders (34.42%) and dental caries (55.90%) were the two main causes of tooth loss. Other significant factors were extraction in cases where the tooth was connected to tumors, cysts, or extra teeth (1.61%), impaction (1.83%), prosthodontic causes (2.19%), and orthodontic causes (1.30%).(42) and another study done in Libya found that dental caries, which caused 1912 extractions (64.6% of all extractions), was the leading cause, followed by severe periodontitis (270.9%), tooth impaction (231.7%), prosthodontic causes (172.8%), and failed root canal therapy (157.3%). 779 (26.3%) female patients between the ages of 21 and 30 had the most teeth pulled. In this group of patients, low education level was the most common risk factor for tooth extraction 1663 (57.2%).(43) Caries (52.2%) and periodontal disease (35.7%) were the two most prevalent reasons for extractions out of 1795 teeth, of which 1795 teeth were gone following extraction treatments. Males had a higher extraction rate, with 394 of their 554 total teeth (71.1%) removed. (44)

These data show the high prevalence of dental caries and high levels of tooth extraction in this population, as well as the restricted access to preventative oral healthcare. In Cape Town, South Africa, females showed greater prevalence of oral illness than males, highlighting the need for preventative oral healthcare services.(45) which is very similar in reasons of teeth extraction in the study conducted in Greece where Caries was the cause for extraction, almost twice as many as extracted for periodontal disease. Of those teeth extracted due to caries (69%) were documented as non-restorable caries (either root or coronal) 31%.

The study found that tooth extractions were performed for caries regardless of age, gender, or socioeconomic standing. The two primary causes of tooth extraction were dental caries and periodontal disease.(46),and contrary to cape town, south Africa, but In Tanzania, the prevalence of tooth loss due to any reason was 83.5%, due to caries63.4% and due to other reasons than caries, 32.5% (47)

2.4 Role of Oral Health Education and Oral Health promotion in prevention of dental caries

However, the report on the study conducted revealed that the effectiveness of the oral health education program increases oral health knowledge, attitude, and practices and decreases the prevalence of untreated dental caries. The role of oral health education and oral health promotion in prevention of dental caries had been reported. The frequency of untreated dental caries in the study population decreased dramatically following the OHE program, and as a result, OHE intervention was found to be strongly linked with better levels of practices for oral health.(48) but also in other studies done on oral hygiene procedures found to be effective in controlling dental caries and again a rational individual oral hygiene were found to be significant in prevention of dental caries which is a main cause in teeth extractions (49)(50) in systematic review, Topical fluoride gel, fluoride varnish, chlorhexidine, pit and fissure sealant, and patient education were discovered as methods for preventing dental cavities.(51) another study done in Kenya found that intensive oral health promotion is a tool to reduce the higher prevalence of dental caries(52) the same in Sao Tome oral health education to school children and their parents have been found to be crucial in preventing dental caries and teeth extractions(53)

If dental care and oral health awareness are implemented early and encouraged, difficult dental treatment needs can be kept to a minimum, according to a study on oral health knowledge, oral hygiene status, and dental caries.(54)

CHAPTER THREE: METHODOLOGY

3.1 Study design

In order to investigate the implementation of an intervention to lower the rate of tooth extractions, a before and post intervention research design was adopted in this project. Finding the team to work with on this quality improvement project was the first step in the pre intervention evaluation process.

The source of data was health management information system and patients register in the period of January to June 2021 for baseline data. The assessment of the magnitude of the problem served as the baseline data and the root cause analysis was conducted together with QI Officer, Director general and director of finance. The best solutions were selected after comparative analysis. The implementation of intervention was monitored and evaluated according to the activities presented in the Gantt chart. A post intervention evaluation was conducted in April 2023 (Appendix) And analysis were done using SPSS.

3.2 MAGNITUDE OF THE PROBLEM

For data collection, the researcher started by informing the hospital managers and QI officer about the project to be conducted, and the data were collected.

In the HMIS system, baseline information detailing the scope of the issue was gathered.

To find the magnitude of the problem, retrospective data of dental patients were used and all data were collected from monthly reports done in the service of dentistry. Individual cases were collected from HMIS system after getting the permission for data collection for baseline data. the IT manager of Remera Rukoma gave us the data from January to June/2021, and compiled them in excel.

3.3 Tool

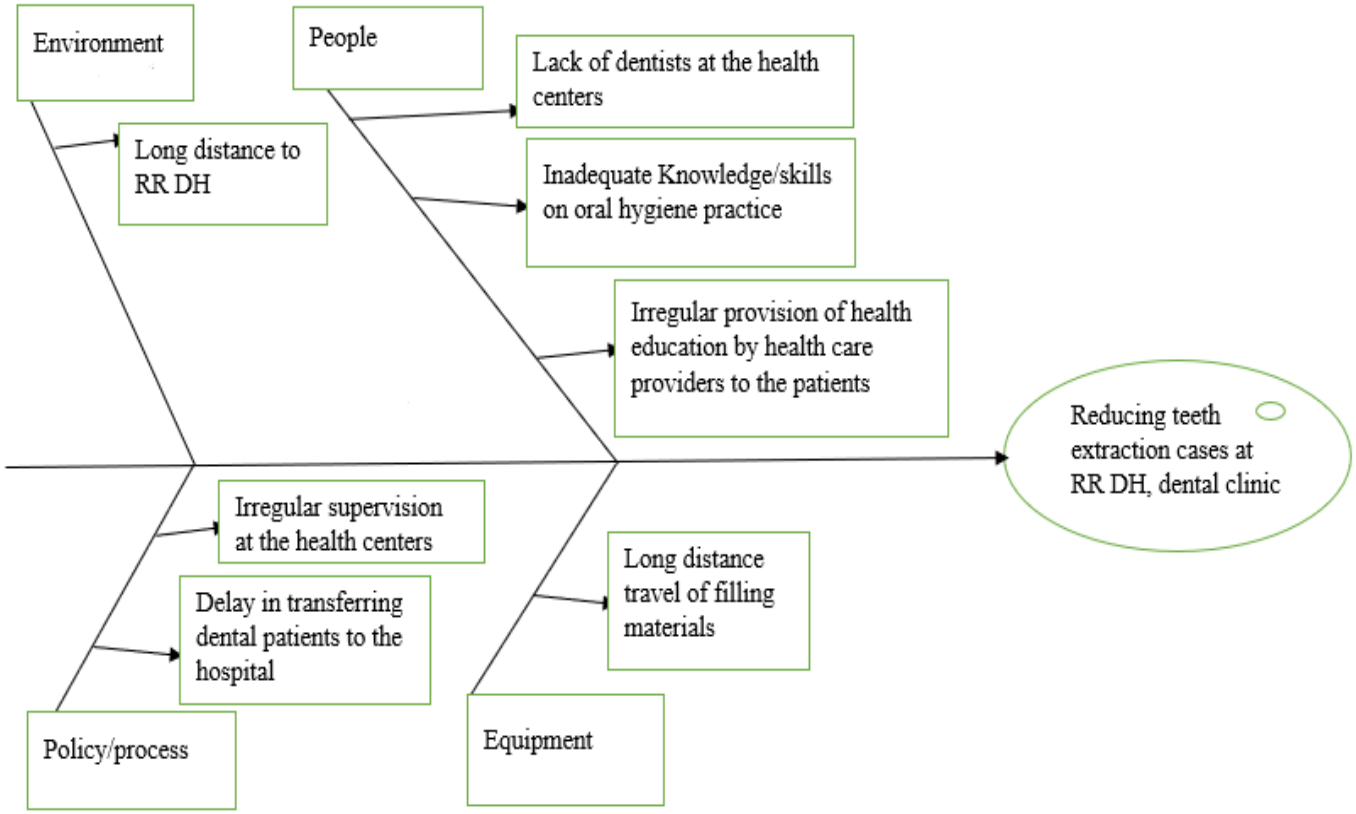
After requesting and getting the permission, we have adopted a questionnaire from a study conducted in Zambia by Nursing students on Oral Hygiene Experience, knowledge of Oral Health and Oral Diseases and Attitudes about Oral Health Care in 2010(55) and the data related to each suggested possible causes were collected and analyzed prior to the final root cause identification but also to some suggested root causes, observation and discussions, interview guide with the team have been used to take the conclusions.

3.4 Root Cause Analysis

The researcher and quality improvement focal person, and dentists we discussed and brainstormed on possible causes of high rate of teeth extraction practices

The staff's comments were compared to those from other publications using the literature review, and potential reasons from four primary categories—people, the environment, policy and procedure, and equipment—were shown on a fishbone diagram.

Figure1: Fish bone illustrating the possible causes of high rate of teeth extraction practices at REMERA RUKOMA



3.5 VERIFICATION OF ROOT CAUSES

In verification of the root causes, we adopted a questionnaire from a study conducted in Zambia by Nursing students on Oral Hygiene Experience, knowledge of Oral Health and Oral Diseases and Attitudes about Oral Health Care(55) The data related to each suggested possible causes were collected and analyzed prior to the final root cause identification but also to some suggested root

causes, observation and discussions, interview guide with the team have been used to take the conclusions.

The information was collected using the questionnaire and recorded in Excel and then imported in **SPSS software** for analysis**.**

3.5.1 Equipment

Long time of stock out of filling materials

In verification of this suggested root cause, we have used observation.

The ideal is that dental restorative materials should not go under stockout however 12 months of stock out were consecutively observable in the pharmacy of stock of Remera Rukoma district hospital as it is presented in the table below

Table 2: Represents the stock out of restorative materials by months

X represent presence of stockout of the restorative materials listed in the table 2

Through observation 12 months of consecutive stock out on the store card together with the administration, we agreed that it is a problem though cannot be considered as root cause of high rate of tooth extraction because in case of stock out of filling materials/restorative materials patients can be transferred at the next level of the health facility. It is in line with Rwanda Integrated National Health Sector Referral Guidelines stating that a patient can be directly referred/transferred in case of specific emergency and when the facility cannot handle the needed technical intervention. (56) **We've rejected this as cause**

Months	**Zinc oxide eugenol (powder and liquid), dycal (base and catalyst), Amalgam, Glass ionomer fuji 9, and composite**
August/2020	**X**
September/2020	**X**
October/2020	**X**
November/2020	**X**

December/2020	**X**
Janvier/2021	**X**
February/2021	**X**
March/2021	**X**
April/2021	**X**
May/2021	**X**
June/2021	**X**
July/2021	**X**

3.5.2 Policy/procedure/system

3.5.2.1 Delay in transferring/referral of dental patients

This suggested root caused was verified using questionnaire and interview guide to the health care providers.

3.5.2.2 Sample size

All 185 patients participated during the period of 1 months

Table 1 presents the number of tours the patients had to attend to the health centers for transfer letter from health centers to the Remera Rukoma hospital. From the collected information, it takes our respondents to go to the health centers two time 134(72.4%), once 34(18.4%) and three time and above 17 (9.2%) to get the transfer letter. Which is actually against the normal practices, if a case is not to be managed at certain level of the health facility it is directly transferred to the next level form health center to the district hospital and from district hospital to the provincial/referral hospital respectively.

Table 3: Number of tours spent by patients at Health Center before getting transfer letter (N=185)

Data collection combined file audit and interviews with healthcare providers on delay in transferring dental patients to the hospital, done at Nyagihamba and Karama health centers among 30 health care providers ,18out of 30 have responded that they wanted to cure the problem with the prescribed drugs, 4 out of 30 responded that they did not know that there is another option to

the treatment provided ,8 out 30 said they did not directly transfer the patients following the will of patients of not being directly transferred to hospital.

Number of rounds to HC	**Frequency/Percentage**
One	34(18.4)
Two	134 (72.4)
Three and above	17(9.2)
Total	**185 (100)**

Table 4: Reason why the healthcare providers they delayed to transfer dental patients

From Our participants requested transfers two times 134(72.4%) compared to once 34(18.4%) and three time and above 17 (9.2%) to get the transfer letter as it is shown in table 1 and the ideal is that patient should be directly transferred if he/she cannot be treated at certain health facility and following that 18 (60) of the health care providers wanted to cure the problem with the prescribed drugs**,** Did not directly transfer the patients following the will of patients of not being directly transferred 8(26.7) and Did not know that there is another option to the treatment provided 4(13.3).

Response provided	**Reasons, the healthcare providers they delayed to transfer dental patients**
	Frequency/percentages
Wanted to cure the problem with the prescribed drugs	**18 (60%)**
Did not know that there is another option to the treatment provided	**4(13.3%)**
Did not directly transfer the patients following the will of patients of not being directly transferred	**8(26.7)**
Total	**30(100)**

According to Rwanda Integrated National Health Sector Referral Guidelines health centers will refer to the district hospital level. In case of specific emergency, clients will be referred directly from Health Center to the district hospital (after communication with district hospital), by-passing the district hospital in order to avoid delay of case management under the following reasons: When a patient needs expert advice as determined by the attending health professional, When the referring facility cannot provide the necessary technical examination, the patient is immediately moved or referred where the technical intervention is available.(56) and Delaying treatment for dental caries has several negative effects, including tooth extraction and delayed eruption of permanent teeth, since it is thought to be a prevalent local cause of delayed development in the permanent dentition.(57).Therefore, we **retained delay in transferring dental patients** as real root cause

3.5.2.3 Irregular supervision at the health center.

This suggested root cause was verified through observation, and tally sheet.

The ideal is that every health facility supervises another healthy facility under each, through observation we found that there were no supervision plan and schedule for dental activities.

Every level of the hierarchy of Rwanda's health system is in charge of supervising the level below it. A group from the district administrative unit handles supervision. The managing administrator, the pharmacy manager, or other supervisors often carry it out.(58)

Table 5: represent the availability of supervision plan of the hospital to the health centers.

✓ represents availability of supervision on monthly basis, through observation and discussions, Supervision was done in the last 12 months though were done without incorporating dental activities and has been discussed about and the supervision(evaluation) checklist is not including dental aspects, we have recommended to add dental elements in the checklist they use, we **rejected it.**

Months	**Supervisions at the health centers under the catchment area of Remera Rukoma DH**
August/2020	✓
September/2020	✓

October/2020	✓
November/2020	✓
December/2020	✓
Janvier/2021	✓
February/2021	✓
March/2021	✓
April/2021	✓
May/2021	✓
June/2021	✓
July/2021	✓

3.5.2.4 Lack of dentists at the health center under RR DH

This cause has been verified by discussion together with observation with the team.

We decided that lack of dentists at the health centers can not be the cause as patients still have opportunity to be transferred at the health facility where dentists are employed/available and transferring a patient to where technical intervention is available it is in line with Rwanda health referral guidelines. Therefore, we rejected it as cause.

3.5.3 Environment

3.5.3.1 Long distance travel of dental patients seeking for dental treatment

This root causes was verified using the data collected from the respondent's using questionnaire.

3.5.3.1 Sample size

All 185 patients participated during the period of 1 months.

Table 6: represent every health center and distance from the health center to RR DH

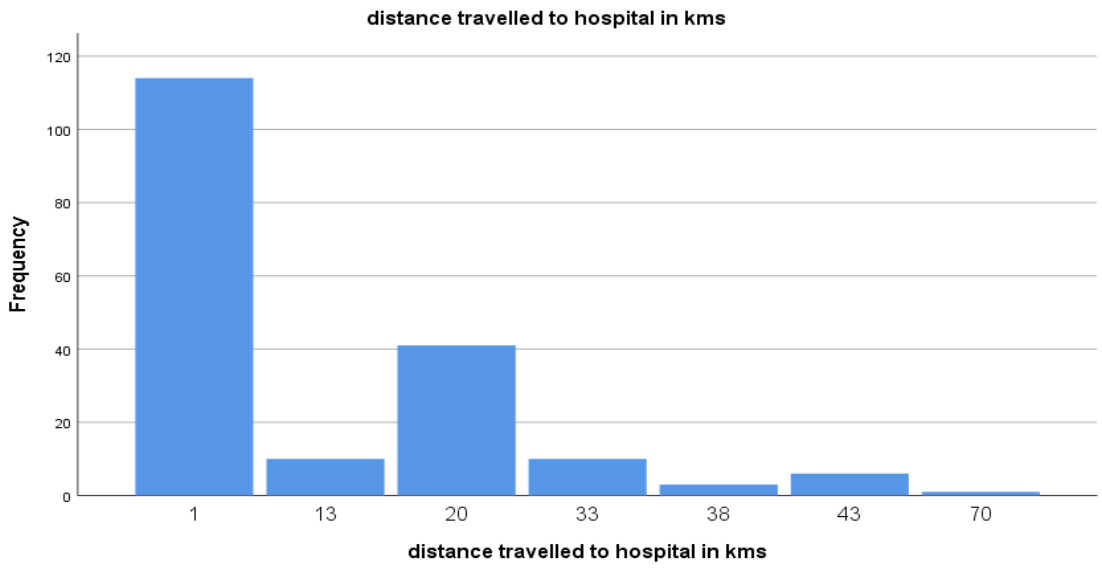
From the questionnaire out of 185 respondents 62% reported that they travel a distance of one Kilometer to reach the health center. From the existing distance from every health center to

Remera Rukoma District hospital as established/measured by Insurances for billing and payment purposes.

Name of the health center/sector As it is one health center by sector	**Distance from health center to Remera Rukoma District hospital (kms /to and from)**
Rukoma	1
Kamonyi/kabuga/karama	20
Karangara	13
Kayenzi	33
Musambira/gihara	43
Nyamiyaga	38
Kigese	50
Mugina	90
Nyagihamaba	64

Figure2: representing distance travelled by dental patients seeking dental treatments

Based on the fact that 185 of the respondents (62%) reported that they travelled a distance of one kilometer to reach the health facility, as one kilometer is not long distance. according the results on the impact brought by the decentralization of health services report that among all Rwandans the walking time to the health facility was halved to 47 minutes in 2020. Therefore**, we rejected long-distance travel as a root cause.**



	Distance traveled by patients to hospital in kms							
Kms	1	13	20	33	38	43	70	
Frequency	114	10	41	10	3	6	1	
Percentages	61.6%	5.4%	22.2%	5.4%	1.6%	3.2%	0.5%	

3.5.4 People.

3.5.4.1 Inadequate oral hygiene/oral health education provision by health care providers to the patients attending the health centers.

This suggested root cause, was Verified using data collected from our questionnaire.

3.5.4.2 Sample size

All 185 patients participated during the period of 1 months

3.5.4.3 Oral Health Education provision to the respondents

Table 7: Represent Oral Health Education provision by health care providers to the respondents (N=185)

From the table 7, it Indicates that majority of respondents 97.8% (181) do not get oral health education from health center nurses on how to take care of their oral health /oral hygiene. **Yes**: represents participants those who got oral health education, **No**: represents those who did not get oral health education.

	Received oral health education
	Frequency/percentages
Yes	4(2.2)
No	181(97.8)
Total	185 (100)

Reference is made to the public health facilities services packages in Rwanda health promotion Activities specify that health center should provide promotion activities in the following disciplines: Behavior change communication and health education, Health promotion in schools, Eye health promotion, Dental health promotion, Healthy lifestyles: nutrition, exercise, no smoking or drug use, Hygiene, sanitation and Health promotion on: communicable & non- communicable diseases(59),According to Rwanda accreditation standards on patients and family state that all patients should receive comprehensive and consistent education on how to manage well their health conditions. The healthcare providers are responsible for providing educational content to patients by methods that foster understanding of the health care materials. This is a serious healthcare concern in health center because they don't provide health education to patients as indicated by 181(97.8%) of the respondents. Reported that they do not receive oral health education from their health care providers. Based on the data, we end up by **accepting it a as a root cause** (inadequate provision of oral health education) because every patient should receive health education.

The table 8: presentation of the frequency of cleaning of teeth among the respondents (N=185)

While The American Dental Association advises using fluoride toothpaste and cleaning our teeth twice a day for two minutes each., among our respondents only 59 (31.9%) brush two time/day and 118 (63.8% only clean once regardless of what they use to brush). Which show the lack of sufficient knowledge and skills in oral hygiene practice. The table 4 indicates that 4(2.2%) of the respondents they don't own what to uses to clean their teeth,11(5.9%) they use Miswak ,20 (10.8% they use water rinsing/gargling.

Frequency of brushing	**Cleaning of teeth among the participants**
	Frequency/ percentages
No	4(2.2)
One	118 (63.8)
Two	59 (31.9)
Three	4 (2.2)

Table 9: Presentation of materials used by participants to clean their teeth (N=185)

From our participant 20% of them use water gargling as means of cleaning the teeth

Materials	**Materials used by participants to clean their teeth**
	Frequency and percentages
Don't have	**4** (2.2%)
Miswak	**11** (5.9%)
Water gargling	**20** (10.8%
Toothpaste and toothbrush	**150** (81%)
Total	**185(100%)**

Table 10: Knowledge of participants on other Dental Treatments apart from extraction(N=185)

Indicate the knowledge/awareness of the respondents about other dental procedures that can be done apart from extraction, Among the respondents on knowledge about other dental treatments apart from extraction 165(89.2%) of the respondents. They do not know any other dental procedures apart from extraction and only 20(10.8%) managed to give examples of other dental procedures apart from extraction.

	If the participant is aware of other dental procedures
	Frequency and percentages
Yes	20(10.8)
No	165 (89.2)
Total	185(100)

Table 11: Teeth lost as a result of dental caries versus tooth decay (N=185)

The respondents who lost their teeth were 165 and it's associated with lack of knowledge on why teeth decay. There is an association between lack of knowledge/awareness on why teeth decay and number of teeth lost due to dental caries.

	Number of teeth	**If the participant knows why teeth decay**		
		No	**Yes**	**Total number of teeth lost**
Loss of teeth due to caries	**0**	20	9	29
	1	52	10	62
	2	49	1	100
	3	30	0	90
	4	6	0	24
	5	4	0	20
	6	2	0	12
	10	2	0	20
	Total	**165**	**20**	**357**

The table 12: Indicate that the lesser the knowledge/awareness on why teeth decay the more the tooth loss/extraction due to caries.

Under this more teeth lost due to caries are reported among those who said they had average oral hygiene 76, 72 teeth lost under those who said they had poor oral hygiene and 4 teeth were lost among those who said they had good. Although 29 participants did not lose their teeth regardless of the oral hygiene status, poor oral hygiene is associated with dental caries (the lesser oral hygiene the more the chance of losing teeth due to caries).

Oral Hygiene status among the participants	**Number of teeth lost due to caries**									
		0	1	2	3	4	5	6	10	**Total**
	Average	11	38	25	9	1	1	1	0	**87**
	Good	8	3	3	0	0	0	0	0	**14**
	Poor	10	21	21	19	5	3	0	2	**82**
	Very poor	0	0	0	2	0	0	0	0	**2**
		29	62	50	30	6	4	2	2	**185**

The major reason for tooth extraction was dental caries and that caries are associated with poor oral hygiene(60) The same reason for extractions prevalent at Remera Rukoma

3.5.4.4 Root causes rejected or accepted/retained

Possible root causes	**Rejected or accepted**
Long distance travel by dental patients	**Rejected**
Frequent stock out of restorative materials	**Rejected**
No regular supervision	**Rejected**
Inadequate knowledge/skills on oral hygiene practices to the side of dental patients	**Accepted**
Delay in transferring dental patients to the hospital	**Accepted**
Irregular provision of oral health education to patients by health care providers of the health	**Accepted**

3.6 The real root causes

Inadequate knowledge and skills on oral hygiene and oral health education.

Delay in transferring dental patients to the hospital from health centers.

After the meeting with the quality improvement officers and dentists, we affirmed that solving the problem of inadequate knowledge and skills on oral hygiene and health education, will address the problem of delay in transferring dental patients we therefore remain with one root cause which is: **Inadequate knowledge and skills on oral hygiene and oral health education**

3.7 Data Analysis

The pre and post intervention of teeth extraction rate data were compared and the factors that contribute to the predispose to dental caries which is the main factor for teeth extraction were also compared, all statistical tests were conducted using SPSS software

3.8 Ethical consideration

In order to conduct this project, the researcher needed ethical clearance from University of Rwanda, as well as permission from the management of REMERA RUKOMA Hospital as the direct supervisor, The study did not involve patient contact, treatment was unaffected. Instead, we conducted a file audit and received permission from the hospital director to do so, enabling us to gather all the data we need. Patients also provided written consent.

CHAPTER FOUR: RESULTS

The study aimed to implement the Reduction of the rate of teeth extraction practice from 90 to 40 % at RR DH.

The interventions were implemented with Gant chart. The multidisciplinary team including the researcher, dental surgeon, quality improvement officer of the hospital participated.

During the period of six months (from October 2022 to march 2023) of intervention the rate of teeth extraction has decreased form 90% in pre_intervention to 67% after intervention. The oral health education by health care providers has increased from 2% to 81% with P-value =0.002 which is statistically significant, there is also an increase of the recommended frequency of brushing among the participants from 31% to 49% with p value =0.002 which less than 0.005, consequently there is an increase from 1.4% to 15.6% in restorative treatment provision with p value = 0.002 less than 0.005 therefore it's a significant change statistically

Table 13: Indicate the level of significance of the changes between pre and post intervention

The intervention we had done, brought a significant change at the level of 0.01

Correlations			
		Before intervention (N= 185)	Post intervention (N= 205)
Before intervention (N= 185)	Pearson Correlation	1	.912**
	Sig. (2-tailed)		.002
	N	8	8
Post intervention (N= 205)	Pearson Correlation	.912**	1
	Sig. (2-tailed)	.002	
	N	8	8
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 14: change in treatment provision and other factors that can affect oral health

There had been a significant improvement in awareness on why teeth decay, awareness on other dental conservative treatment and the frequency in recommended brushing had increased significantly.

variables	Before intervention (N= 185)	Post intervention (N= 205)	total	expected before intervention	expected after intervention	chi square test
One round attendance to health center before transfer	**34**	**194**	**228**	99.96544276	128.0345572	1.31659E-18
Oral health education provision by health care providers	**4**	**172**	**176**	77.1663067	98.8336933	1.06305E-28
Awareness on other dental conservative treatment	**20**	**107**	**127**	55.6825054	71.3174946	1.75749E-10
Patients received teeth extractions	**1065**	**664**	**1729**	758.0712743	970.9287257	4.71841E-50
Patients who received dental conservative/restorative treatments	**16**	**155**	**171**	74.97408207	96.02591793	1.00083E-19
Awareness on why teeth decay	**20**	**166**	**186**	81.55075594	104.4492441	9.42133E-20
Frequency of brushing among the participants in recommended brushing	**59**	**102**	**161**	70.58963283	90.41036717	0.06565309

Table15: Comparison of baseline data with the data post implementation of intervention in terms of the treatments provided to the patients attended RR Dh, dental clinic in HMIS system.

From the table 15, it shows that teeth extraction cases have reduced from 90% to 67%, a reduction of 23% and teeth restoration has increased from 1.4% to 15.6%, an increase of 14.2% and professional cleanings of teeth has increased 4.8%

Treatment provided	**Pre interventions statistics (N=1184)**	**Post interventions results (N=991)**	**Improvement/Changes**
	Frequency/ %	**Frequency/ %**	
Counselling	5 (0.4)	1(0.1)	
Curettage/root planning	7 (0.6)	12(1.2)	
Teeth Extraction	**1065(90)**	**664(67)**	**23% reduction**
Frenectomy	5(0.4)	15(1.5)	
Incision		1(0.1)	
Medication	59(5.0)	69(6.9)	
Obturation (teeth restoration)	**16(1.4)**	**155 (15.6)**	**Increase of 14.2% in restorative treatment**
scaling and root planning	**14 (1.2)**	**59(6.0)**	**Increases of 4.8% in professional cleaning of teeth**
Transfer	12 (1.0)	15(1.5)	

Table 16: Summarize the treatment provided to the patients' vs Gender in post intervention

Female had been in higher number in seeking dental restorative treatment 38(64%) whereas male was 21(36%) and teeth extractions were more common in female 407(61.3%) while Male 257(38.7%), this shows that female are in big number of seeking dental services.

Treatments		Counselling	curettage	Desimpaction	Teeth Extraction	Frenectomy	incision	medication	obturation	scaling and root planning	transfer	
GENDER	**F**	0	6	0	407	7	1	38	113	38	7	617
	M	1	6	1	257	8	0	30	42	21	8	374
Total		1	12	1	663	15	1	68	155	59	15	991

Figure 3: Represent the percentages of teeth Extractions done before intervention and after intervention.

From the above figure it shows that teeth extraction cases reduced 23%

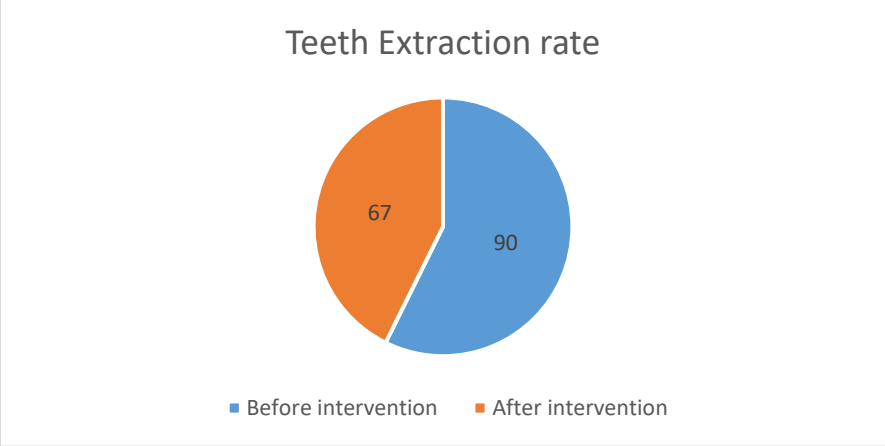


Table 17: summarize behavior characteristics before and after intervention

The Comparison of social behaviors and characteristics of the participants before and after intervention in the response provided in our question.

Information	**Options**	**Before intervention (N= 185)**	**Post intervention (N= 205)**	**Improvement**
Number of rounds done by dental patients before getting transfer paper		Frequency/%	Frequency/%	%
	ONCE	**34(18.4)**	**194(94.6)**	76%
	TWO	**134(72.4)**	**10(4.9)**	
	THREE AND ABOVE	17(9.2)	1(0.5)	
Oral health education provision by health care providers				
	NO	181(97.8)	33(16.1)	
	YES	**4(2.2)**	**172(83.9)**	81%
Awareness on other dental conservative treatment				
	NO	165(90)	98(47.8)	
	YES	**20(10)**	**107(52.2)**	42%
Awareness on why teeth decay				
	NO	165(89.2)	39(19.0)	
	YES	**20(10.8)**	**166(81.0)**	70.2%
Frequency of brushing among the participants	**NO**	4(2.2)	2(1.0)	
	ONCE	118(63.8)	88(42.9)	
	TWO	**59(31.9)**	**102(49.8)**	17.9%
	THREE	4(2.2)	13(6.3)	

MEASURES

Table 18: Represents process indicators and output indicators before and after intervention

The oral health education by health care providers has increased from 2% to 81% which also justify the increase of the recommended frequency of brushing among the participants from 31% to 49% and a reduction from 72% to 4.9% of two rounds in number of tours/rounds used to do dental patients before getting transfer paper from the health centers.

Comparison Pre and Post intervention

INDICATORS	Options	Before intervention	Post interventio n	Change
		Frequency/ %	Frequency/ %	%
	Process indicators			
The frequency of brushing among dental patients	**Frequency of brushing**			
	No	4(2.2)	2(1.0)	
	Once	118(63.8)	88(42.9)	
	Three	4(2.2)	13(6.3)	
	Two	59(31.9)	102(49.8)	**17.9%**
The number of patients who are aware of dental restorative treatments	**No**	165(90)	98(47.8)	
	Yes	20(10)	107(52.2)	42%
Percentage of provisions of oral health education by health care providers	**No**	181(97.8)	33(16.1)	
	Yes	**4(2.2)**	**172(83.9**	**81.7%**
Number of tours/rounds that dental patients do seeking dental treatment		**Number of rounds/tours**		
	Once	34(18.4)	194(94.6)	76%
	three and above	17(9.2)	1(0.5)	
	Two	134(72.4)	10(4.9)	
	Outcome indicators			
Number of patients who received extracted		**1065(90) (N=1184)**	**664(67) (N=991)**	23%
Number of patients who received dental restorative treatments		**16(1.4) (N=1184)**	**155(15.6) (N=991)**	14.2%

CHAPTER FIVE: DISCUSSION

5.1 Discussion

The main objective of this study was to reduce the rate of teeth extraction cases at RR DH and the researcher observed the increase in dental restorative treatments demand and provision. And increase in frequency of the recommended two time of brushing, The method used was a pre and post intervention study that explored the oral health education and oral hygiene practices and early transfer of dental patients to the district hospital to prevent teeth extractions

It was found that the teeth extraction rate was at 90% of all others treatment provided in pre intervention and become 67% of all other treatments provided in post intervention which is less compared to the rate of teeth extractions in Greece 82.1%(61) but also there is remarkable increase in frequency of brushing among our participants which is two time with fluoridated toothpaste as recommended by WHO, in pre intervention was 31% and become 49% in post intervention and was higher compared to that was reported in Tanzania(62)

In our project early transfer of dental patients was a problem as it was requiring our patients to go to the health center more than once to get the transfer paper, and following the intervention provided it changed from 18% to 94% to one round attendance at the health center, and on lack of awareness on why teeth decay our results indicates that we increased the awareness from 10% to 81% and study had revealed that inadequate knowledge on this matter lead to teeth extraction and suggested increase in awareness in awareness to reduce teeth extractions practices(63)

Whereas when there was little knowledge of caries prevention, caries formed quickly, and progression rates were high, the focus on restoration and retention of teeth was an improvement over the prior treatment method of tooth extraction. This is similar to what we did in our study, where our focus was to raise awareness of oral health and the provision of restorative treatment.(64) though Correct health information or knowledge alone does not always result in desirable health behaviors, as has been shown in dentistry and other health-related fields. However, knowledge gained may serve as a tool to equip population groups with accurate information about health and health care technologies, empowering them to take action to protect their health. Which may also continually help our study population(65)Strong data suggests that brushing with a fluoride-containing toothpaste is more successful than brushing with a non-fluoride toothpaste when it comes to the prevention of dental caries while in our study most of our participants were

using other materials(66)in another study its outcomes confirmed the remarkable value of fluoride toothpaste as a child's dental caries prevention strategy which should be also done in the study area for reinforcing the caries prevention program as caries mostly contribute to the teeth extraction.(67). On the side of Professional recommendations for individual oral hygiene mostly include tooth brushing at least twice daily while in our study we found that most of our participants were brushing a less than 50% twice daily therefore there is need to keep providing the oral health education to the people in the study area (68).

5.2 Limitations of the project

The study was only limited to reducing of the rate of teeth extraction at RR DH, and did not look to the outcome in income generated from providing restorative/conservative treatment, and the provision of restorative dental treatments has a big impact as in a study done indicated that extraction rates were lowered by the increase in provision of restorative treatments and participated in generating income(69).

We did not access patients records at the healthy center to evidence the authenticity of the number of tours the patients attended to the health center before getting the transfer, again we did not achieve our objective of reducing the rate of teeth extraction from 90% to 40% but we managed to reduce to the rate of 67% due to time period.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

The oral health education we conducted in this study reduced the teeth extraction rate from 90% to 67%.

We did not achieve our objective of reducing the rate of teeth extraction from 90% to 40% but we managed to reduce to the rate of 67% due to time period.

Even though time constraints prevented us from achieving our goal, we discovered that oral health education and oral hygiene practices, along with the earlier transfer of dental patients to the hospital, decreased the rate of teeth extraction cases, rejecting the null hypothesis.

6.2 Recommendation

We recommend for a longitudinal study for teeth extraction rate at RR DH after a certain period of time. Other quality improvement projects at the hospital should use a strategic problem-solving approach, especially for causes identified in this study that were not chosen for intervention. Other recommended future studies include ones on the RR DH's factors for tooth extraction.

Therefore, all levels of the health facilities should build continuing, because some healthcare institutions experience staff turnover and primarily because QI projects involving health behavior change take a long time to complete because behavior change is a process, it is necessary to provide ongoing health education to the beneficiaries (patients) in order to sustain and advance QI efforts.

All levels of the health facilities need to keep providing oral health education to our community as behavior change is a process, to comprehend the durability of the intervention, longer-term follow-up is required.

We recommend all health facilities for adding dental elements on the checklists the health facilities use in supervisions as it is not including dental aspects.

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APPENDICES

Appendix 1: COMPARATIVE ANALYSIS OF INTERVENTIONS

Comparative Analysis on cost

Strategic alternatives	**Cost**	**Score**
Provide training to the health care providers of the health centers on the issues of oral health education In 13 days (one day per health center)	Refreshment of trainees Cost:**200,000 Rwfs** Training materials cost: **90000rwfs** (Transport, water and teaching materials)	4
Provide IEC/oral health education to the patients of RR DH and the health centers (under RR DH)	Cost: **300.000rwfs** (Teaching materials, model, toothbrush and tooth paste, projector, posters, flipchart, marker)	3
Conduct community outreach and regular supervision at the health centers on the issue of oral health	Material Cost: **4.000.000** rwfs (Toothpastes, tooth brushes, transport, and lunch)	2
Deploy oral health professionals /dentist at every health center under RR Catchment area (13 dentists) of the 13 health centers	Cost :**2.376.000** per month(salary) Annual cost: **28.512.000** rwfrs	1

Comparative Analysis on time

Strategic alternatives	**time**	**Score**
Provide training to the health care providers of the health centers on the issues of oral health education	Time: 26 days	3
Provide IEC/oral health education to the patients of RR DH and the health centers (under RR DH)	Time: 13 days	4
Conduct community outreach and regular supervision at the health centers on the issue of oral health	Time: 65 days	1
Deploy oral health professional /dentist at every health center under RR Catchment area	Time:56 days	2

Comparative Analysis on impact

Strategic alternatives	Impact	Score
Provide training of the health care providers of the health centers on the issues of oral health education	will firmly address the problem at over 50% because health care providers will have skills and knowledge but will not directly affect the patients but it is long run	3
Provide IEC/oral health education to the patients of RR DH and the health centers (under RR DH)	This will boost the way of living of the patients as it will increase the awareness and care of patients about their oral health at the maximum 80%	4
Conduct community outreach and regular supervision at the health centers on the issue of oral health	can only impact the attendants during the time of the outreach, can impact at 5%, Conducting the outreach and supervision will not solve the issue of provision of oral health education by nurses. Will only benefit the participants	1
Deploy oral health professional /dentist at every health center under RR Catchment area	Will solve the problem of lack of provision of oral health/hygiene education to patients and there will be no need for nurses to intervene	5

Comparative Analysis on feasibility

Strategic alternatives	Feasibility	Score
Provide training of the health care providers of the health centers on the issues of oral health education	Providing the training will be accepted though we cannot be Sure, that health care providers will give oral health education after boosting their skills and knowledge.	4
Provide IEC/oral health education to the patients of RR DH and the health centers (under RR DH)	Providing IEC/oral health education to the patients of both RR DH and the health centers will help us to send direct the message to the community at health facility need and it is not against any rule or regulation it's actually what it is recommended (to provide IEC to all patients attending the service) but it takes time to abide with the new behavior (behavior change is a process)	3

Conduct community outreach and regular supervision at the health centers on the issue of oral health	Will require the permission of local leaders (district level) as it will require gathering a big number of populations. Community outreach will not reach everyone in the community	2
Deploy oral health professional /dentist at every health center under RR Catchment area	Will require that the administration has the budget for salary which actually seems to be not possible	1

Strategic Alternatives	**Evaluation Criteria (5=good; 1=bad) together with explanations**				
	Cost	**time**	**Impact**	**feasibility**	**Score**
Provide training of the health care providers of the health centers on the issues of oral health education	Refreshment of trainees Cost :**200000 rwfs** Training materials cost: **90000rwfs** (Transport, water and teaching materials) **(4)**	Time: 26 days **(3)**	will firmly address the problem at over 50% because health care providers will have skills and knowledge but will not directly affect the patients but it is long run **(3)**	Providing the refresher training will be accepted though we cannot be Sure, that health care providers will give oral health education after boosting their skills and knowledge. **(4)**	**13**
Provide IEC/oral health education to the patients of RR DH and the health centers (under RR DH)	Cost: **300.000rwfs** (Teaching materials, model, toothbrush and tooth paste, projector, posters, flipchart, marker) **(3)**	Time: 13 days **(4)**	This will boost the way of living of the patients as it will increase the awareness and care of patients about their oral health at the maximum 80% **(3)**	Providing IEC/oral health education to the patients of both RR DH and the health centers will help us to send direct the message to the community at health facility	**13**

				need and it is not against any rule or regulation it's actually what it is recommended (to provide IEC to all patients attending the service) but it takes time to abide with the new behavior (behavior change is a process) (**3**)	
Conduct community outreach and regular supervision at the health centers on the issue of oral health	Material Cost: **4.000.000** rwfs (toothpastes, tooth brushes, transport,and lunch) **(2)**	Time: 65 days **(1)**	Conducting the outreach and supervision will not solve the issue of provision of oral health education by nurses can only impact the attendants during the time of the outreach, can impact at 5% Will only benefit the participants **(2)**	Will require the permission of local leaders (district level) as it will require gathering a big number of populations. Community outreach will not reach everyone in the community **(2)**	7
Deploy oral health professional /dentist at every health center under RR Catchment area	Cost :**2.376.000** per month(salary) Annual cost: **28.512.000** rwfrs **(1)**	Time: 56 days **(2)**	Will solve the problem of lack of provision of oral health/hygiene education to patients and there will be no need for other health care provider to intervene **(5)**	Will require that the administration has the budget for salary which actually seems to be not possible **(1)**	5

Appendix 2: Decision Matrix

Strategic Alternatives	**Evaluation Criteria (5=good; 1=bad)**				
	Cost	**time**	**impact**	**feasibility**	**Score**
Provide training of the nurses of the health centers on the issues of oral health education	**4**	**2**	**3**	**4**	**13**
Provide IEC/oral health education to the patients of RR DH and the health centers (under RR DH)	**3**	**4**	**3**	**3**	**13**
Conduct community outreach and regular supervision at the health centers on the issue of oral health	2	1	2	2	7
Deploy oral health professional /dentist at every health center under RR Catchment area	1	2	5	1	9

Appendix 2: GANTT CHART

TASKS	Responsible Person	November_ 2022	December _2022	January _ 2023	Februay_2023	March_2023	April_2023
Informing the health center managers about the Ongoing activity	Researcher and QI						
Arranging teaching and training materials (model)	Researcher and other dental team of RR DH						
Provision of the training about oral health education to all healthcare providers at every health center	Researcher and fellow of RR DH						
Providing IEC/oral health education to all patients at the health centers and at RR DH, dental clinic	Nurses of the health center and dental team of RR Dh						
Collect data to evaluate impact	Team and researcher						
Report and feedback	Researcher						

Appendix 3 : EVALUATION AND MONITORING PLAN

Indicator	Definition		Person	How	When
Number of health care providers of health centers trained on oral health education provision	Number of health care providers skilled on oral health education provision		Researcher	Attendance list of training	october_March 2023
Reduction of number of tours/rounds that dental patients do seeking dental treatment	Number of tours reduced		Researcher	Questionnaire will reveal	October _March 2023
Number of patients who received dental conservative/restorative treatment	Number of patients received restorative treatment		Researcher	HMIS system And register of patients	October _March 2023
The increased frequency of brushing among dental patients	Number of patients with recommended frequency of brushing (2)		Researcher	Questionnaire Will reveal	October _March 2023
Increased number of patients who are aware of other dental treatment apart from extraction	Number of participants who reported to be aware of other conservative treatment apart from extraction		Researcher	Questionnaire will reveal	October _March 2023

Appendix 4. Ethical clearance

UNIVERSITY of RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DIRECTORATE OF RESEARCH & INNOVATION

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 06/10/2022
Ref: CMHS/IRB/**445**/2022

DUSENGE Jean d'Amour

Masters of Hospital and Healthcare Administration,
School of Health Sciences, CMHS, UR

Dear DUSENGE Jean d'Amour,

RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled ***"Reducing Teeth Extraction Practices at Remera Rukoma District Hospital, Dental Clinic."***

Having reviewed your application and been satisfied with your protocol, your study is hereby granted ethical clearance. The ethical clearance is valid for one year starting from the date it is issued and shall be renewed on request. You will be required to submit the progress report and any major changes made in the proposal during the implementation stage. In addition, at the end, the IRB shall need to be given the final report of your study.

We wish you success in this important study.

Assoc. Prof. Stefan Jansen (PhD)
Acting Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate studies, UR

h

EGLISE PRESBTERIENNE AU RWANDA

HOPITAL REMERA RUKOMA

BP 201 KIGALI

Rukoma, on 23rd August 2021

To Jean d'Amour DUSENGE

RE: Acceptance for permission to collect data

I am pleased to inform you that your request for permission to collect data for your research dissertation entitled " **Decreasing the rate of tooth extraction perfomed omong the patient attending Remera Rukoma Hospital** " at Remera Rukoma hospital has been accepted .

Thank you for your time to choose this hospital,

Yours Sincerely,

Dr JARIBU Théogène

Director General of Remera Rukoma Hospital

CC:

-Research and Education Officer

Appendix 5: **Questionnaire**

Urahitamo interuro ijyanye n'ukuri

Imibereho y'abaturage iranga abitabiriye

1.Imyaka y'uwitabiriye …….

2. Amashuri yize ……

3.Igitsina cy'uwitabiriye

a. Gabo b. Gore

4. Ubwoko bw'umurimo akora

(A). Ese ufite umurimo ukora

a.Yego b. Oya

(B). Ukora uwuhe murimo?

……

5. Mbese uturuka he? (Umurenge n'Akagari)

……

6.Ugenda ibirometero bingana gute ujya gusaba ubuvuzi bw 'amenyo no mu kanwa uvuye ku kigo nderabuzima? (hitamo kamwe)

a. Ikigonderabuzima cya Remera rukoma (1km)

b.Ibigo nderabuzima Kamonyi, Kabuga,karama (20 km)

c. Ikigonderabuzima cya Karangara (13km)

d. Ikigonderabuzima cya Kayenzi(33km)

e. Ibigonderabuzima cya Musambira,Gihara (43km)

f. Ikigonderabuzima cya Nyamiyaga (38km)

g. Ikigonderabuzima cya Kigese (50km)

h. Ikigonderabuzima cya.Mugina (70km)

i. Ikigonderabuzima cya Cyeru (90km)

j. Ikigonderabuzima cya Nyagihamba (64km)

k. Ahandi ……

7. Ukoresha iki mu kugera aho usabira ubuvuzi bw'amenyo n'indwara zo mu kanwa? (hitamo kamwe)

a.Ujyenda n'amaguru

b.Ujyenda uteze itagisi

c.Ujyenda uteze igare

d.Ujyenda n'igare ryawe

e.Ujyenda uteze moto

f.Ujyenda ukoresheje moto yawe

g.Ujyenda ukoresheje imodoka yawe

h. ikindi ugenda nacyo…….

8. Ukoresha amafranga angahe mugutega kugirango ugere hano ku bitaro?

a. Ntayo
b. Hagati ya 1000-2000 amafranga y'uRwanda
c. Hagati ya 3000-5000 amafranga y'uRwanda
d. Hagati ya 6000-800 amafranga y'uRwanda
e. Andi mafranga waba utanga……...

9.Ni inshuro zingahe wagiye ku kigonderabuzima mbere yuko baguha urupapuro rukuzana (taransiferi) ku bitaro?

a.Inshuro imwe **b.**Inshuro ebyiri

c.Inshuro eshatu kuzamura

10.(A)Mbese uzi impamvu amenyo acukuka?

a. Yego b. Oya

(B)Niba ari Yego vuga zimwe muri zo

…….

11.Mbese ukunda kurya ibiryo by'ibinyasukari (shokora,ibisuguti,amabombo)

a. Yego **b.**Oya

12.(A) Mbese umuforomo(kazi) wo ku kigo nderabuzima hari amakuru/amasomo yaguhaye ajyana n'ubuzima bwo mu kanwa mbere cg nyuma yo kugusuzuma?

a.Yego **b**.Oya

(B)Niba ari, Yego ni ayahe masomo bakwigishije

……..

13**.** (A)Ujya woza amenyo yawe no mu kanwa?

a.Yego b.Oya

(B)Niba ari yego ,Mbese woza mu kanwa ryari?

a. Mugitondo

b. Nimugoroba maze gufata amafunguro

c. Mugitondo na nimugoroba maze gufata amafunguro

d.Mugitondo na saa sita maze kurya

e. Mugitondo saa sita maze gufata amafunguro na nijoro maze kurya

(C) Niba ari yego woza mu kanwa inshuro zingahe

a. Rimwe ku munsi

b. Kabri ku munsi

c.Gatatu

14.Mbese ukoresha iki mu koza amenyo no mukanwa?

…….

15. Mbese ukoresha igihe kingana gute mu koza amenyo no mu kanwa?

a. Munsi y'umunota umwe (1)
b. Hejuru y'umunota ariko munsi y'iminota ibiri (2)
c. Hejuru y'iminota ibiri ariko munsi y'iminota (3)
d. Hejuru y'iminota itatu ariko munsi y'iminota ine (4)
e. Hejuru y'iminota itanu (5)

16.(A**)** Mbese amasinya yawe ajya ava amaraso,iyo urimo koza mu kanwa?

a. Burigihe
b. Rimwe na rimwe
c. Nta narimwe

(B)Niba ujya uva amaraso, mbese wagereranya ute ingano y'amaraso uva mu kanwa?

a. Mva amaraso make
b. Mva amaraso aringaniye
c. Mva amaraso menshi

17. Mbese wagereranya ute ingano y'isuku yo mu kanwa kawe

a. Ni nziza cyane
b. Ni nziza
c. Iragereranije
d. Ni nkeya
e. Ni nkeya cyane

18.Mbese hari ububabare ufite mu kanwa?

a. Yego
b. Oya

19. (A). Mbese hari ubundi buvuzi waba uzi bushobora guhabwa umuntu urwaye amenyo ,usibye kuyakura ? a.Yego **b.**Oya

(B). Niba ari Yego, hari ingero watanga z'ubundi buvuzi muganga w'amenyo yaha umurwayi w'amenyo

1…….2……

3……...4……

20. Mbese ubonana na muganga w'amenyo ryari mu mwaka?

a. Buri mezi atandatu
b. Buri mwaka
c. Iyo mfite ububabare
d. Sinigeze njya kureba muganga w'amenyo

21.(A)Wigeze utakaza amenyo kubw'ingaruka zo gucukuka kwayo?

a. Yego b. Oya

(B) Mbese umaze gutakaza amenyo angahe?.....

22. (A) Mbese wigeze utakaza amenyo kubw'izindi mpamvu?

a. Yego b. Oya

(B) Niba ari Yego kubw'izihe mpamvu.

……

23.(A)Mbese gutakaza amenyo hari ingaruka byakugizeho?

a. Yego Oya

(B)Niba ari Yego watanga ingero

1…… 2…….

3…… 4…….

24. Mbese uhindura uburoso bw'amenyo bwawe mugihe kingana gute? **(cyasubizwa bitewe n'icyasubijwe ku kibazo cya 14)**

a. Buri mezi atatu
b. Buri mezi atandatu

c. Buri mezi cumi n’abiri
d. Ntabwo mpindura
e. Ntabwo ngira

25.Mbese utekereza niba kutagira isuku mu kanwa bishobora gushyira ubuzima bwawe bwose mu kaga.

a. Yego
b. Oya
c. Ahari
d. Simbizi

26.Mbese hari umuntu wo mu muryango wawe wigeze nibura akurwa amenyo ageze kuri atandatu (6) munsi y’imyaka mirongo itatu n’itanu (< 35).

a. Yego
b. Oya
c. Simbizi

27.Mbese Unywa itabi?

i. Yego
ii. Oya