KNOWLEDGE, ATTITUDE AND PRACTICE OF DENTAL HEALTH WORKERS TOWARD THE USE OF ONLINE MEDICAL DATABASE FOR CLINICAL DECISION SUPPORT

EMMANUEL Nzabonimana

College of Medicine and Health Sciences

School of Public Health

Master of Science in Health Informatics

2016

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by

NZABONIMANA Emmanuel

215042331

Submitted in partial fulfilment of the requirements for the Master of Science in

HEALTH INFORMATICS

In the

Department of Health Informatics

School of Public Health

College of medicine and health science

Supervisor: Pr. KATO Njunwa

Co-Supervisor: Dr. Moses Isyagi

June, 2016

DECLARATION

I do hereby declare that this research dissertation submitted in partial fulfillment of the requirement for the Master's Degree in Health Informatics, UNIVERSITY OF RWANDA COLLEGE OF MEDICINE AND HEALTH SCIENCES School of Public Health. This is my original work and has not previously been submitted elsewhere. Also, I do declare that a complete list of reference is provided indicating all the sources of information quoted or cited.

Emmanuel Nzabonimana

Student Number: 215042331

Signed……..

Date……..

DEDICATION

I dedicate this work to God, who created us.

To my parents who guided my first steps and initiated the base of my studies.

ACKNOWLEDGEMENTS

My sincere appreciation goes to my supervisor, Prof. Kato Njunwa and my Co-Supervisor Senior Lecturer, Dr Moses Isyagi for their unparalleled guidance, support and coaching. I am also thanking the University of Rwanda for its support during my studies.

I am also appreciating all dental health workers work within Rwanda for their great contribution and cooperation during data collection.

ABSTRACT

Background: In today's time pressured work environment, the dental health workers are likely to find it hard to leave the patient on the chair or in the waiting room to go to the library for addition information on disease and also the appropriate treatment that support their clinical decision at real point of care.(1) A wireless personal digital assistant, Desktop computer or Tablet personal computer can provide access to the medical information and other data, by assuming that the data are maintained in readily accessible electronic databases.(2)

Objective: To determine knowledge, attitude and practice of dental health workers toward the use of online medical database for clinical decision support among all registered oral health care professionals within RAHPC and RMDC resident within Rwanda

Significance: Once barriers of using online medical resources are identified interventions can be proposed to lower or eliminate the barriers and restrictions thereby encouraging the uptake and utilization of these tools to enhance clinical decision making, support and professional development at provider level.

Methodology: A study population covered all licensed dental health workers. An online self-administered questionnaire was used to collect data regarding knowledge, attitude and practice of dental health workers toward the use of online medical database for clinical decision support. A pilot study with 12 dental health workers was done prior to the study to pre-test questionnaire. Unregistered dental health workers were excluded in this study.

Result: This study show that among respondents 160 (80%) were using internet based resources to support their clinic decision while 41 (20%) of dental health workers they don't use internet based resources to support their clinic decision.

Recommendation: I recommend the health facility that had dental services to organize the special workshop and CPD courses on the available peer reviewed locally relevant online based resources and smartphone applications for support clinical decision.

KEY WORD

Knowledge

Attitude

Practice

Online medical database

Dental health workers

Clinical decision support

LIST OF SYMBOLS AND ACRONYMS

BDS: Bachelor in Dental Surgeon

BDT: Bachelor in Dental Therapist

CDE: Continuing Dental Education

CDOE: Continuing Dental Online Education

CDSS: Clinical Decision Support System

CIAP: Clinical information access portal.

CME: Continuing Medical Education

CPD: Continuing Professional Development

EHMIS: Electronic Health Management Information System

EMR: Electronic Medical Record

ICT: Information and Communication and Technology

JADA: Journal of the American Dental Association

Q: Question

RAHPC: Rwanda Allied Health Professional Council

RMDC: Rwanda Medical and Dental Council

RxList: Internet Drug Index database

SPSS: Statistical Package for the Social Science

USA: United State of American

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CHAPTER 1: INTRODUCTION

1.1. DEFINITIONS OF KEY TERMS

Knowledge: is awareness or understanding of someone or something, such as facts, information, description or skill which is acquired through experience, education by perceiving, discovering or learning.

Attitude: the way you think and feel about something

Practice: "the act of doing something regularly or repeatedly to improve your skill at doing it"(3)

Online: Connected to a computer, a computer network, or internet.

Medical : " relating to the treatment of diseases and injuries : of or relating to medicine"(4)

Database: " is any collection of data organized for storage, accessibility and retrieval".(5)

Dental health worker: is a person who is trained and qualified to perform dental service as are prescribed by the regulations.(6)

CDSS: Clinical decision support system include computer programs, internet resources and smartphone application that are designed to provide expert support during clinical decision

Database: is a collection of information that is organized so that it can easily be accessed, managed and updated.

1.2. BACKGROUND FOR THE STUDY

A few years back most health workers relied on the library of the clinic as the main source of the information by looking answers from their colleagues about certain disease condition to support their decision making process about certain treatment options for their patients. However, these approaches that were used to get answers to their questions were not always sufficient for every clinical question arising at the point of care.(7) With the current high work pressure environment, the clinician can't find a time to leave the patient on the chair or in the waiting room to go back to the library for clinical information related to the appropriate treatment of the patient.(8) Instead, a wireless personal digital assistant, desktop computer or tablet personal computer can provide access to the medical information and other data, by assuming that the data are maintained in readily accessible electronic sources. So, anytime, anywhere, dental health workers can access the major online medical resources to support their clinical decision making (9).

The lack of real time availability of the right information at the point of care is considered as a health care delivery obstacle faced by health workers in developing countries. Likewise, the lack of knowledge on computer usage and internet access hinder healthcare givers from using available online medical resources to update knowledge and hence improve their clinical decision making.(10)

Some diseases in developing countries are on the rise , a situation which obliges the dental health workers to keep up to date with the medical information on the management of current oral health conditions, By using the available online dental & medical online based resources will improve the patient care and clinical decision support on time.(11)

The tools used in clinical decision support facilitate health workers to make better clinical diagnostic decisions in a short time period and also protect the patient (12). Health related information from web based online medical databases facilitate providers in decision making. For this reason, dental health workers must be knowledgeable on the application of online medical databases and resources. In addition developing positive attitudes and daily practice in using available web based information for career advancement and improved quality of care to their patients(13).

Acute medical care often demands timely, accurate decisions in complex situations. Computerized clinical decision support systems have many features that could help. The effective usage of online medical database for CDSS is supported by a minimal level of computer literacy in order to gain access to online medical databases which may be closed or open access. Open access web based online clinical decision making and support applications such as MEDSCAPE, are accessible via computer or on Smartphone to support health provider decision making with regard to diagnostic investigations, drug dosage, interactions and adverse effects which are critical in a clinical setting.(14)

In Developed Countries use of online or web based tools to aid clinical care of patient has been documented. A study in Sweden related to the follow up of Chronic heart failure care found that 67% of health care workers used web based or online resources with 74% of respondents reporting positive attitudes toward ICT application in health care use and up to 96% were positive regarding the future of healthcare ICT. (15) . On the African continent limited access to ICT infrastructure and low rates of computer literacy have been cited as an obstacle towards uptake and utilization of web based health care resources for clinical decision making and care especially amongst female health care workers who form the bulk if the health care workforce in Africa. (16)

Several study done showed that most of the time clinicians rely most heavily on colleagues for answers rather than using the online based resources to support their decision.(17)

In Rwanda, the national ICT policy encourages the leverage of ICT in all sectors in order to arrive at the vision 2020 goals. This also applies to the health sector where EMR and eHMIS technologies are being rolled out to enhance patient care. The use of online oral health databases to support clinical decision making and care is yet to be studied in Rwanda. This study seeks to ascertain knowledge, attitude and practice of dental health workers toward the use of online medical database in clinical decision making and support.

1.3. RESEARCH PROBLEM STATEMENT

In the past, most health workers relied on the hospital or clinic reference library anecdotes from colleagues as their main source of clinical information about certain disease or condition to support their decision making. This approach was time consuming and insufficient for every clinical question that may be arise at the point of care due to the current high work pressure environment, the dental health workers can't find a time to leave the patient on the chair or in the waiting room to go back to the library for clinical information related to the appropriate treatment of the patient. There are many online knowledgeable database that can be readily accessible everywhere through a wireless personal digital assistant, personal computer and mobile devices in order to support decision making during point of care in short time without spending much time in finding books, asking experienced colleagues and searching paragraph in whole book that support their idea in order to treat their patient. In Rwanda the basic knowledge, attitude and practice that enable dental health workers utilize online healthcare resources to aide clinical decision and care are yet to be evaluated. This study seeks to ascertain knowledge, attitude and practice of dental health workers toward the use of online oral health database during clinical decision making among all registered dental health workers working in whole Rwanda.

1.4. OBJECTIVE OF THE STUDY

1.4.1. MAIN OBJECTIVE

To determine knowledge, attitude and practice of dental health workers toward the use of online medical database for clinical decision support among all registered oral health care professionals within RAHPC and RMDC resident within Rwanda.

1.4.2. SPECIFIC OBJECTIVES

1.4.2.1. Appraise the awareness of online oral health databases and resources amongst dental health workers.

1.4.2.2. Determine Attitude toward online dental health databases and resources amongst oral health care professionals

1.4.2.3. Ascertain the usage of smart phone applications and online resources for consultation, clinical decision making and support amongst oral health care workers.

1.5. RESEARCH QUESTIONS

1.5.1. Are oral health care providers aware of online medical &dental resources?

1.5.2. What are the attitude of oral health care providers toward online dental health databases and resources?

1.5.3. What are the applications and online resources are utilized by oral healthcare professionals to support their clinical decision making and practice?

1.6.SIGNIFICANCE OF THE STUDY

Online oral health databases and resources are a potential tool for facilitating clinical decision making, research, enhancing quality of care and provision of continuing professional development. Their uptake is influenced by the knowledge, attitude and practice of the end-user which is yet undetermined in Rwanda.

Determining knowledge, attitude and practice of oral health care providers regarding online oral health databases and resources can provide important information on intrapersonal and extra personal barriers that exist towards their adoption in routine clinical practice and professional development. Once barriers are identified interventions can be proposed to lower or eliminate the barrier restrictions hence encouraging the uptake and utilization of these tools to enhance clinical decision making, support and professional development among dental health workers.

1.7. CONCEPTUAL FRAMEWORK

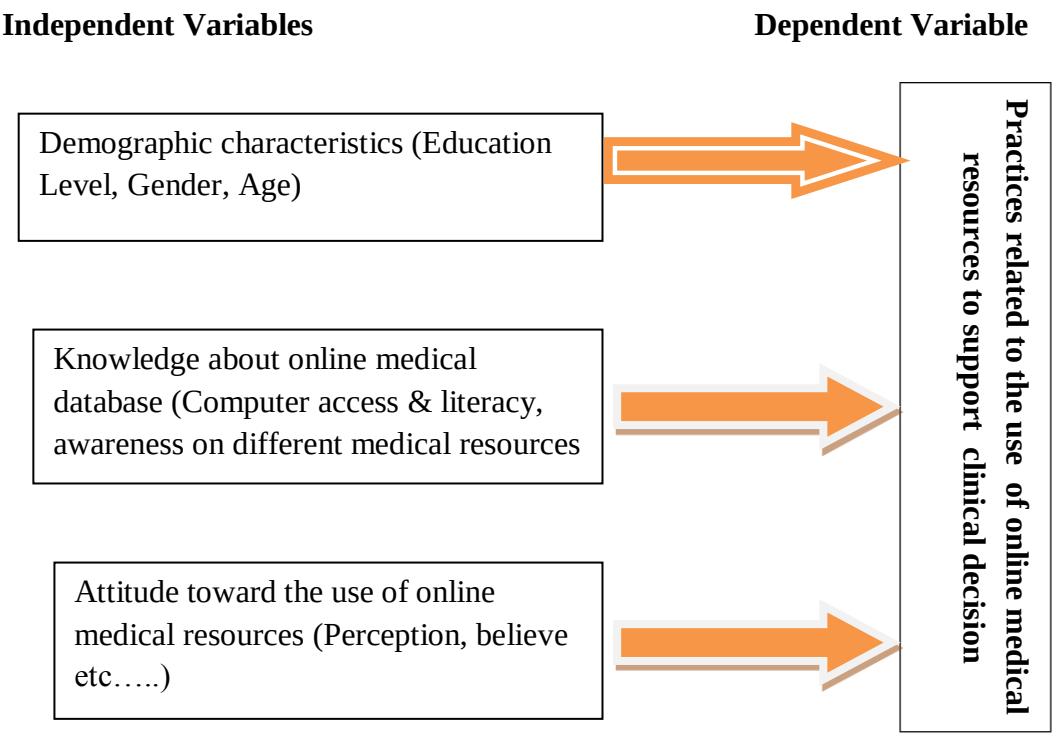

Figure 1: Conceptual framework indicating factors relating to the use of online medical database to support clinical decision.

The illustration above shows the relationship between the dependent and independent variables. It shows the factors that affect adoption of practice on the usage of online medical database for taking clinical decision, These factors include Demographic characteristics like dental qualification which related to their different level of education, Dental health workers knowledge about online medical resources and also attitude toward the use of online medical resources to support clinical decision. This concept framework were adapted to one of the study related to knowledge ,attitude and practice study done by Mwanje, LF.(18)

1.8.SUBDIVISION OF THE STUDY

This dissertation is divided into two main parts which are also divided into chapters. The first part show and describes the identity of study, and it is composed of Declaration, Dedication, Acknowledgment, Summary, Table of contents, List of abbreviations and symbols, List of tables, List of figures and list of photographs. The second part is divided into the following chapters:
The chapter one is an introduction, it is covers the background of the study, problem statement, objectives, research questions and subdivision of the study.

Chapter two is a Literature review describe the recent study done, it gives mainly the background of online bibliographic database and the role of online bibliographic database in medical settings.

Chapter three is the methodology which shows us the study design, study area, sampling methods, procedures data analysis techniques that was used to this study ,the chapter four is composed of results and chapter five covers the discussion and the last chapter is the conclusion and recommendations This study is finally ended by a list of references and annexes.

CHAPTER 2: LITERATURE REVIEW

2.1. ATTITUDE AND PRACTICE OF DENTAL HEALTHWORKERS TOWARD THE USE OF WEB BASED INFORMATION TO SUPPORT CLINICAL DECISION

Survey conducted in the united stated of America on estimating the proportion of dental practitioners on the use of online base resources information for practice guidance based on four indicators which are : "read journals online, obtained continuing education (CDE) through online sources, rated an online source as most influential and reported frequently using an online source for guidance" result show that 3% of dental practitioner acquired Continuing dental education through online sources, 5% of dental health workers read different journals online, 13 % of dental health workers reported frequently using an online source for guidance while 14% of dental health workers are rated an online sources as most influential .(19)

A Cross-sectional study done to examine the self-reported information-seeking behaviors of dental health workers in three dental practice-based research networks showed the majority of participants were male (81%) that the information-seeking behaviors of dental health workers in three practice-based research networks and overall respondent prefer reading the printing journal than reading the journals online and the most reading journal are JADA was ready by 76% of the respondents and 28 % of participants demonstrated that informal conversation with colleagues was most influential for practice guidance.(20)

Study done by American college of dentists showed that "The Internet has potential to make dentists more effective decision makers. Statistics are given regarding current patterns of computer usage by dentists and it reveal that the usage of computer by dentist is primarily related to communication rather than decision support. The Internet will increasingly fulfill its promise as an information resource for practitioners as issues such as access; searching, understanding, relevance, and cost are solved. The future of the Internet includes a number of likely enhancements: technical changes, portals, meta-sites, personalization, collaborative filtering, and improved information retrieval".(21)

In the Developed Country use of online or web based tools to aid clinical care of patient has been document. A study in Sweden related to the follow up of Chronic heart failure care found that 67% of health care workers used web based or online resources with 74% of respondents reporting positive attitudes toward ICT application in health care use and up to 96% were positive regarding the future of healthcare ICT. (15) . On the African continent limited access to ICT infrastructure and low rates of computer literacy have been cited as an obstacle towards uptake and utilization of web based health care resources for clinical decision making and care especially amongst female health care workers who form the bulk if the health care workforce in Africa. (16)

Study to determine allied health professionals actual and reported use of a point of care online information retrieval system and to make an assessment of the extent to which use is related to direct patient care by testing two hypothesis, Hypothesis 1: Clinician use l2online evidence primarily to support clinical decisions relating to direct patient care, and Hypothesis 2: Clinicians use online evidence predominantly for research continuing education ,result demonstrated that among the total of 100 clinicians 63% of clinician reported that they were aware of clinical information access program and 75% of those had used it. Eighty eight % of users report clinical information access program had a potential to enhance patient care and 41% reported direct experience of this by conclusion online evidence use increase with patient admissions and it is supporting the hypothesis that clinicians' use of evidence is related to direct patient care.(22)

The internet is a popular resource for health information, not only among the general public, but also among physicians. Currently, it is estimated that 73.6% of individuals in North America are internet users(23).

2.2. COMPUTER KNOWLEDGE AND INTERNET ACCESS AMONG HEALTH PROFESSIONALS

Study conducted in Africa among rural primary health facilities in Ghana and Tanzania aims on assessment of health providers' computer knowledge, experience and attitude prior to the implementation of electronic clinical decision support system, result showed that among total of 108 providers responded, 63% were from Tanzania and 37% from Ghana. The mean age was 37.6 years and 79% were female. Only 40% had ever used computers, and 29% had prior computer training. About 80% were computer illiterate or beginners. Educational level, age, and years of work experience were significantly associated with computer knowledge ($p<0.01$). Most (95.3%) had positive attitudes towards computers. Interview and group discussions showed that most of them were lacking computer knowledge and experience. It is important to provide adequate training and support on computer application to ensure the successful uptake of electronic CDSSs in health sector because the positive attitude to computers found in this study highlight that also rural care providers are ready to use technology.(16)

Study done in United State of American on family physicians' information seeking behaviors: "A survey comparison with other specialties showed that Family physicians found the Internet to be useful and important as an information source. They were more likely to search for patient oriented material than were specialists who more often searched literature, journals and corresponded with colleagues. Hand held computers were used by almost half of family physicians. Physicians consider the internet important to the practice of medicine and the majority uses it regularly. Their searches differ from colleagues in other specialties with a focus on direct patient care questions. Almost half of family physicians use hand held computers, most often for drug reference."(24)

In India at Punjab site an explorative study conducted to evaluate computer knowledge, attitudes and skills among nurses working in the hospital revealed that majority of nurses had 75% on the awareness of computer and among those nurses 100% of them had positive attitude toward usability of computer. 50.8% and 30.8% had average and fair computer skills respectively." No significant correlation was found between nurses' computer knowledge"(25).

Study done in Harvard Medical school USA, on Physicians' internet information seeking behaviors, a survey about internet use and physician information seeking showed that "almost all physicians have access to internet, and most believe it is important for patient care. The most frequent use is in accessing the latest research on specific topic, new information in a disease area, and information related to a specific patient problem. Critical to seeking clinical information is the credibility of the source, followed by relevance, unlimited access, speed, and ease of use. Electronic media are viewed as increasingly important sources for clinical information, with decreased use of journals and local continuing medical education (CME). Barriers to finding needed information include too much information, lack of specific information, and navigation or searching difficulties".(26)

2.3. TOOLS FOR CLINICAL DECISION SUPPORT SYSTEM

A Seventy studies reviewed during Systematic review demonstrated that decision support systems significantly improved clinical practice in 68% of trials, about five features of decision support system the intervention features were significantly more likely to improve clinical practice than interventions lacking the feature, then Multiple logistic regression analysis identified that the four remaining features as " independent predictors of improved clinical practice: automatic provision of decision support as part of clinician workflow ($P < 0.00001$), provision of recommendations rather than just assessments ($P = 0.0187$), provision of decision support at the time and location of decision making ($P = 0.0263$), and computer based decision support ($P = 0.0294$)" then over the total of 32 system that were evaluated 94% significantly improved clinical practice(27).

2.4. ONLINE MEDICAL DATABASE AND RESOURCES

In developing countries particularly in Africa the use of online bibliographic databases is still a big challenge to medical professionals whereby in Nigeria there was found to be lack of confidence to download full-text articles from online resources (28). It has also been found that the level of awareness of the use of Medline/PubMed, HINARI, Africa

Journals Online (AJOL) and other online bibliographic databases varies and is generally low (29).

Online health databases are important tools in medicine for both literature research and clinical practices, as they provide the current scientific insight for evidence based medicine (30).

The study conducted in Nigeria indicated that 24% of participants used Medline in research, while 6% utilized Medline in patient care, and 26% in preparation of assignments and clinical cases (31). Even though Medline searching from clinical settings is feasible with brief training and affects clinical decisions, searchers experienced the lack of many relevant citations and this lead to inefficient search.

2.5. SMARTPHONE APPLICATION USED BY HEALTH PROFESSIONALS DURING POINT OF CARE

The application that used to support clinical decision during point of care are grouping into two category, Group one related to the application that require subscription and group 2 are related to free online application, the study of comparison were conducted aim to determine the best performance in term of clinical pharmacology between Epocrates Premium and RxList.com and Epocrates Free application, the result showed that subscription databases performed better than the free databases application and there was a significant p-value 0.001.(32)

The study conducted to assess the smartphone medication adherence application to improve medication non-adherence, evaluate features of adherences and identify future opportunities and barriers facing adherences result showed that among all application MyMedSchedule, MyMeds, and RxmindMe application rated the highest because of their basic medication reminder features coupled with their enhanced levels of functionality.(33)

2.6. Factors govern the usage of clinical decision support system

“Computerized decision support systems (CDSS) which improve the quality of patient care are strong and necessary incentives for clinicians to use electronic medical records. We have noted previously that the logical path of CDSS design, which would be to

determine the factors that predict success before the system is designed, appears rarely to have been followed. In this overview update of the literature on predictors of successful CDSS, we conclude that the predictors have not been adequately identified and the success of CDSS may improve when they are."(34)

2.7. Online medical database and resources available that include information for Health professional

The study conducted to assess information seeking behaviors of health sciences faculty, including their use of online databases result showed that 26%(N=198) respondent and Medline was the primary database utilized ,with 78.5% respondents indicating they use the database at least once a week, compared to Medline, Google was utilized more often on a daily basis than Medline.(35)

2.8. Usage of smartphone during point of care in clinical setting

Online survey Study related to clinician use of a palmtop drug reference guide aims to evaluate Online drug database known as Epocrates application found in smartphone and also online web browsing that support dental workers and other practitioner during point of care in time of decision making showed the survey response rate was 32%. Physicians reported that ePocrates Rx saves time during information retrieval, is easily incorporated into their usual workflow and improves drug related decision making. They also mentioned that it reduce the rate of preventable adverse drug event (36)

2.9. Knowledgeable base drug online database

Problems involving drug knowledge are one of the most common causes of serious medication errors. Although the information that dental health professionals need is often available online but retrieving it expeditiously has been problematic. At the same time, clinicians are faced with an ever-expanding pharmacology knowledge base. Recently, point-of-care technology has become more widely available and more practical with the advent of handheld, or palmtop, computing. (36)

Online web resources and database contain information that support medical provider like dentistry to have guideline about different choice of treatment, by giving general information about prescribed medication like drug bank (online drug resources) which is a richly resource that combines detailed drug data with comprehensive drug target and drug action information. The online dental database facilitate continuous development of dentistry by expand their knowledge to improve patient care by making good decision before treating the patients.(37)

CHAPTER 3: METHODOLOGY

3.0. INTRODUCTION

The chapter of methodology describing the study area, study design, study population, sample size, sampling strategy, data collection methods and procedures, data analysis, problems, limitation and ethical consideration.

3.1. STUDY AREA

This study was conducted in whole Rwanda.

3.2. STUDY DESIGN

A Cross-sectional quantitative survey method was used to assess the knowledge, attitude and practice of registered oral health care providers towards the use of online medical database for clinical decision support.

3.3. STUDY POPULATION

The study population was covered all licensed oral health care providers registered within the Rwanda Allied Health Professional Council and the Rwanda Medical and Dental council and resident within Rwanda.

3.4. STUDY SAMPLE & SAMPLING STRATEGY

A Census approach was adopted and all licensed dental health workers were sampled. The list of address of 245 dental health workers registered within RAPHC before March, 2016 were obtained through RAPHC office and the list of 48 dental surgeon registered in RMDC were obtained through RMDC website database(38). Therefore the totals of 293 dental health workers were studied.

A census approach was adopted and all licensed oral health care providers were sampled. The total numbers of licensed oral health care workers with the Allied Health Professional Council (AHPC) are 245 and with the RMDC are 48 Therefore a total of 293 oral health care workers were studied.

3.5. DATA COLLECTION

An online and paper self-administered structured questionnaire with open ended and closed questions was used to collect data regarding knowledge, attitude and practices of oral health care professionals towards the use of online medical database for clinical decision support. The questionnaire was written both in English and French in simple and easy language to be understood by every participant. The questionnaire was adapted ,validated and modified from questionnaires of related studies ((39)(40)).

The electronic questionnaire was designed, piloted and disseminated using online Google Form for participants who were actively available on internet.

A pilot study with 12 dental health professionals was done prior to the study to pre-test the questionnaire. The aim of that pilot study was to ensure the validity and reliability of the questionnaire and to measure the understanding of participants, to ensure the acceptability of the questionnaire and the language clarity. Online informed survey and agreement were considered before the appearance of the survey questions to every participant.

3.6. DATA ANALYSIS

Data were analyzed using IBM SPSS Statistics (Statistical software) Version 20. Both descriptive statistics and bivariate analysis were produced using IBM SPSS Statistics version 20. Descriptive statistics was generated for the variables used to measure the level of knowledge, attitudes and practice and demographic factors of dental health workers towards the use of online medical databases for clinical decision support. Bivariate analysis was used to produce the both cross tabulation and Chi-square tests to test some relationship that may exist between outcome variable and explanatory variables. A p-value of 0.05 was used to assess the strength of the relationship where P-value< 0.05 implies a statistically significant relationship between the outcome variable and predictors. The outcome variable was measured by the question number 15 which is “do you use internet-based resources for clinical decision divided into two categories: Yes or No”, knowledge was measured by Q16 Do you aware on the use of the following professional resources? “ Do you aware of PubMed as a tool to support clinical decision making, Awareness of RxList as a tool to support clinical decision making what do you use internet when you log in split into categories: Reading email, social media, news and

sport, education, search for professional medical and dental information and others ,Q22 Are you aware of medical and dental smartphone applications that you can use to support your clinical decision categories Yes or No" and Attitude measured by Q20 measured on Likertscale: "strongly agree, agree, neutral, disagree and strongly disagree. "And practice measured by do you use internet based resources to support your clinical decision? Do use smartphone application to support your clinical decision and also for consultation purpose? What are the information do frequently search online? "In addition, Tables and graphs were used to present and summarize the results.

3.7. PROBLEMS AND LIMITATION OF THE STUDY

Anticipated problems and limitations included non-response, limited time for data collection, data analysis and logistical challenges related to lack of funding, transport problems and internet accessibility.

To address these problems both online and hard copy questionnaire were used to address internet connectivity issues. Telephone interviews were used to capture data from respondents who are unable to access internet and those who are geographically remote from the researcher.

Some of Dental health workers who refuse to consent in this study were excluded.

3.8. ETHICAL CONSIDERATIONS

The ethical clearance for conducting the research were sought from the CMHS IRB ethical Committee and permission to access allied health professional and Rwanda Medical and Dental council contact details were obtained through the professional councils.

The personal identification information that will be obtained from the participants will be kept confidential and protected from unauthorized user. The participants were informed about the objectives and purpose of the study before data collection and they were no pressure to the participants to respond the questionnaire only those who are willingly to be involve in our study.

On paper self-administered questionnaire informed consent were signed before the beginning of data collection.

This study had no harm to the participants. The benefit of this study is that, participants will be aware of potential (available) online medical database that should help them during point of care for taking clinical decisions without spending time in reading books in clinic.

4.0. INCLUSION AND EXCLUSION CRITERIA

4.1. INCLUSION CRITEARIA

Dental health workers work within Rwanda that have active license to work in dental practice willing to participate will be included in this study.

BDT (Dental Therapist) registered in Allied health professional council and BDS (Dental surgeon) registered in Rwanda medical and dental council resident within Rwanda will be included in this study.

4.2. EXCLUSION CRITERIA

Unregistered trained dental health workers were excluded in this study.
Registered dental health worker that works outside of Rwanda were excluded in this study.
Registered dental health workers without active license were excluded in this study.

CHAPTER 4: RESULTS

4.0. RESULTS PRESENTATION

This chapter discusses data analysis, presentation, interpretation and description of research findings. The purpose of the study was to determine knowledge, attitude and practice of dental health workers toward the use of online medical database for clinical decision support among all registered dental health workers within RAHPC and RMDC resident within Rwanda.

The census approach was used to collect data among all dental health workers resident within Rwanda the total population were 293 dental health workers. The dental health workers that participated in this study were 201 giving a 69% response rate to be involved in my Study.

4.1. DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS

Of the 201 respondents, 68% (137) were male and 31.8% (64) female giving a male to female ratio of 2:1.The response rate for dental therapists was 94% (N=189) compared with 6% (N=12) for dental surgeons. The majority of respondents, 65% (130) were in the 31 to 40 years age group.

In terms of work localization 65% (131) of respondents were from urban areas. Most of the respondents were employed in Private dental clinics 78 (39%) followed by 52(26%) located in District Hospital with health centers accounting for only 1% of respondents.

With regard to professional qualifications of the dental therapists, 125 (62%) had A1 dental Diploma in Dental Therapy, 60 (30%) a bachelor of Dental therapy, 4(2%) of respondents had a bachelor degree in dental therapy with specialization. Five % (5%) of respondents had bachelor degree in dental surgery with 2 (1%) having a specialization. Table 4.1 summarizes the demographics for the study respondents

TABLE 4.1.DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS

Demographic	Frequency	Percentage
Gender (N=201)		
Male	137	68%
Female	64	32%
Age groups (N=201)		
20-30 year old	53	26%
31-40 year old	130	65%
41-50 year old	18	9%
50 and above	0	0%
Working Location		
Urban area	131	65%
Rural area	70	35%
Type of Health facility		
Provincial Hospital	13	6%
Referral Hospital	32	16%
District Hospital	52	26%
Health Center	2	1%
Private polyclinic Providing Dental services	24	12%
Private dental clinic	78	39%
Qualifications		
Specialist Dental Surgeon	2	1%
A0 Dental Surgeon	10	5%
A0 Dental Therapist	60	30%
A0 Dental therapist with specialist qualification	4	2%
A1 Dental Diploma in Dental Therapy	125	62%

4.1.1. Distribution of the respondents by dental qualifications and gender

Amongst dental surgeons 80% (8) were male and 2% (2) were female. Sixty nine percent (86) of A1 dental therapist were male while 31% (39) were female compared with 65% (39) were male while 35% were female for A0 Dental therapist with 2 %(N=4) A0 dental therapist with specialty.

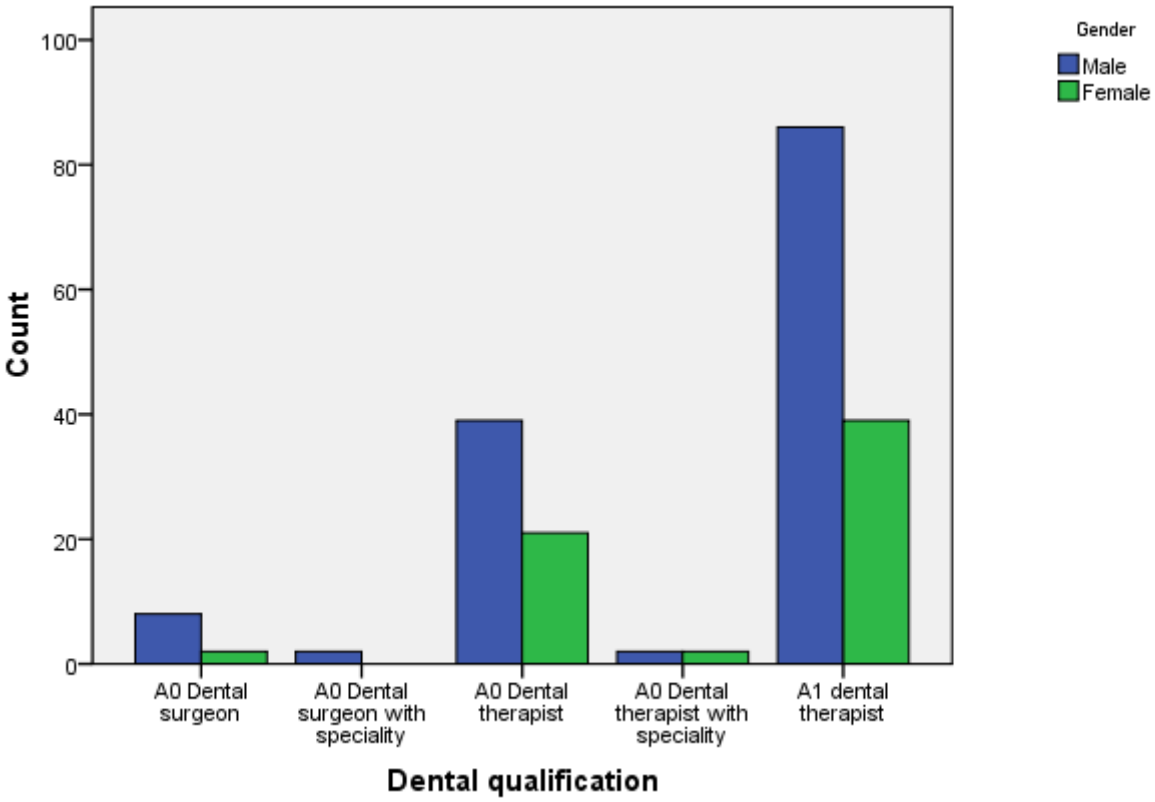

Figure 4.1 Distribution of respondents by gender with their respective qualification (N=201)

4.2. AWARENESS OF ONLINE ORAL HEALTH DATABASES AND RESOURCES AMONGST DENTAL HEALTH WORKERS.

4.2.1. Awareness of medical and dental smartphone application that can be used to support clinical decision making

The majority of the respondent, 94% (N=189) reported that they are not aware of specific professional medical and dental applications, that can be used to support their clinical decision making. A1 dental therapist showed highest degree of lack of awareness 96% (120), A0 Dental therapist lack of awareness 96.7%, the high awareness found on dental surgeon with specialty on 100%.

Dental qualification	**Are you aware of medical and dental smartphone applications that you can use to support your clinical decision?**		
	Yes	**No**	**Total**
A0 Dental Surgeon	1(10%)	9(90%)	10(100%)
A0 Dental Surgeon with specialty	2(100%)	0	2(100%)
A0 Dental therapist	2(3.3%)	58(96.7%)	60(100%)
A0 Dental therapist with specialty	2(50%)	2(50%)	4(100%)
A1 Dental therapist	5(4%)	120(96%)	125(100%)
Total	12(6%)	189(94%)	201(100%)

Table 4.2.1 Frequency and percentage distribution on the awareness of medical and dental smartphone application that can be used to support clinical decision

4.2.2. Awareness of clinical decision support tools amongst respondents

The majority of the respondents 59.2% (N=119) were not aware on the usage of PubMed, 70.6% (N=142) were not aware on the usage of drug.com, 83.6% (N=168) were not aware on the usage of Medscape and 85.1% (N=171) were not aware on the usage of MedlinePlus as clinical decision support tools.

With regard to professional qualifications 55% (33) of A0 dental therapist were aware about PubMed compared to 32.8% (N=41) for A1 dental therapists and 40% (N=4) AO dental surgeons; 53.3% (32) of A0 dental therapist were aware about drug.com compared to 17.6% (N=22) for A1 dental therapists and 40% (N=4) AO dental surgeons;38.3% (23) of A0 dental therapist were aware about drug.com compared to 4.8% (N=6) for A1 dental therapists and 100% (N=2) dental surgeons with specialty compare 0% of A0 Dental surgeon;35% (21) of A0 dental therapist were aware about drug.com compared to 4% (N=5) for A1 dental therapists and 40% (N=4) dental surgeons compare 0% of Dental surgeon with specialty. The findings are summarized in the table below.

Table 4.2.2 Frequency and percentage distribution on the awareness of clinical decision support tools

Awareness of clinical decision support Tools		Dental qualification					**Total**
		AO Dental surgeon (N=10)	**A0 BDS with specialty(N=2)**	**A0 BDT(N=60)**	**A0 BDT with specialty(N=4)**	**A1 BDT(N=125)**	
PUBMED	**Yes**	4(40%)	2(100%)	33(55%)	2(50%)	41(32.8%)	82(40.8%)
	No	6(60%)	0	27(45%)	2(50%)	84(67.2%)	119(59.2%)
Drug.com	**Yes**	4(40%)	0	32(53.3%)	1(25%)	22(17.6%)	59(29.4%)
	No	6(60%)	2(100%)	28(46.7%)	3(75%)	103(82.4%)	142(70.6%)
Medscape	**Yes**	0%	2(100%)	23(38.3%)	2(50%)	6(4.8%)	33(16.4%)
	No	10(100%)	0%	37(61.7%)	2(50%)	119(95.2%)	168(83.6%)
MedlinePlus	**Yes**	4(40%)	0%	21(35%)	0%	5(4%)	30(14.9%)
	No	6(60%)	2(100%)	39(65%)	4(100%)	120(96%)	171(85.1%)

Table 4.2.2 Frequency and percentage distribution on the awareness of clinical decision support tools

4.2.3. Awareness of RxList as a tool to support clinical decision making amongst respondents

The majority of the respondents 99% (N=199) were not aware on the usage of RxList as clinical decision support tool. The findings are summarized in the graph below.

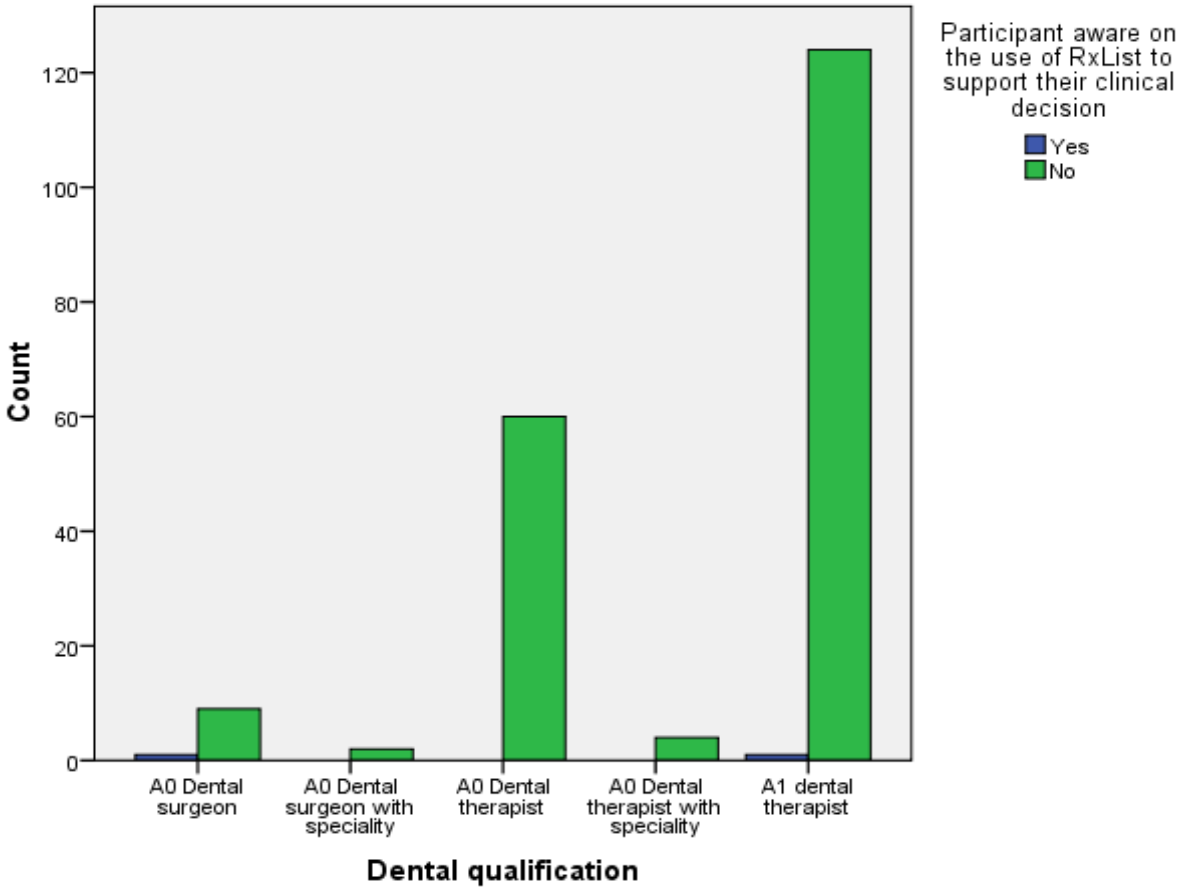

Figure 4.2.1 Frequency and percentage distribution on the awareness of using RxList to support clinical decision among respondents

4.2.4. Awareness of EpocratesPlus as a tool to support clinical decision making amongst respondents

As it is present in the figure 4.2.7 none of dental health workers had awareness on the Epocratesplus database.

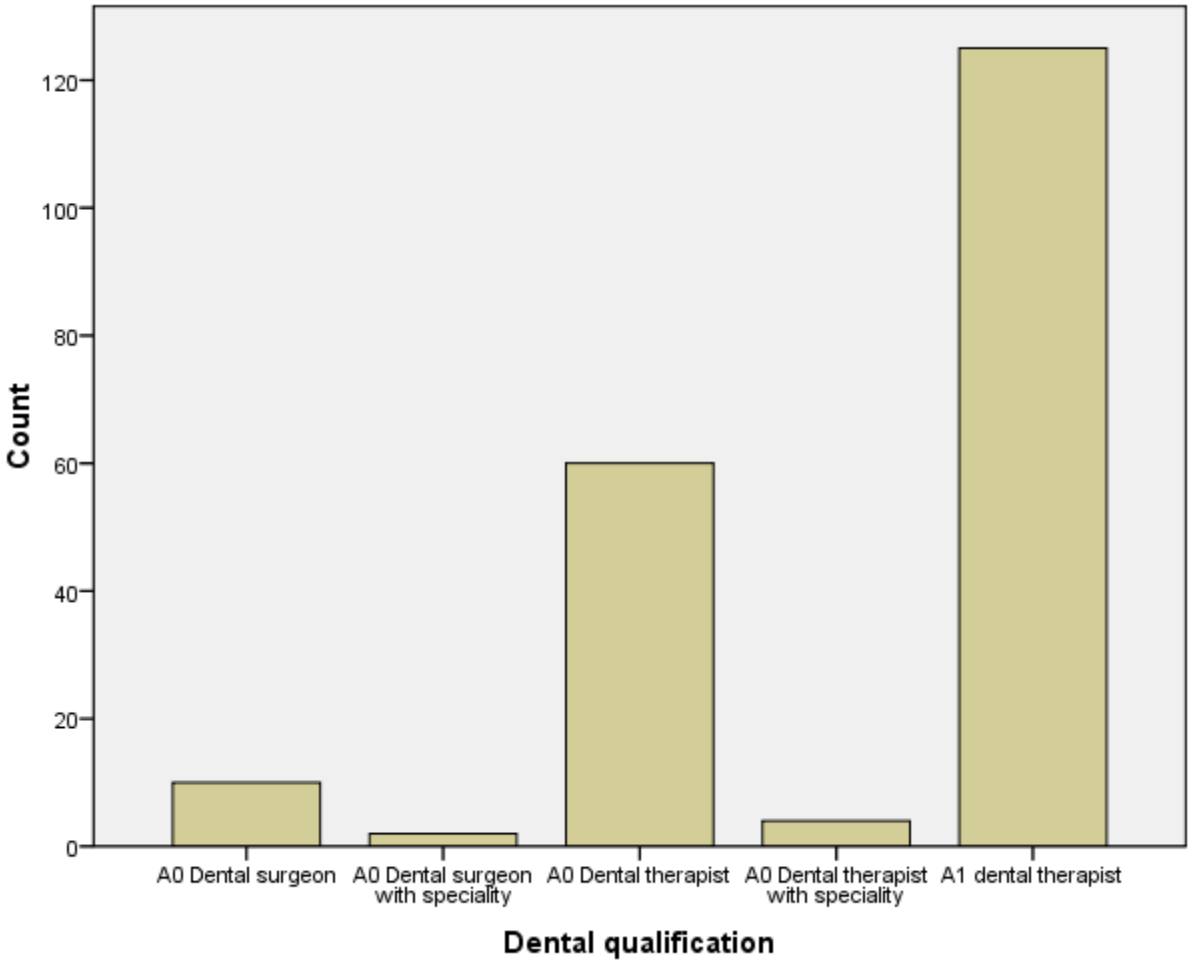

Figure 4.2.2 Frequency and percentage distribution on the awareness of EpocratesPlus as a tool to support clinical decision making amongst respondents

4.2.5. Frequency and percentage distribution on others resources used during clinical decision making among dental health workers

The most used and most recognized resources by dental health workers are presented in Table 4.2.3 The result has shown that the majority of dental health workers were using Google at the rate of 81% and also 119(60%) of the dental health workers were using YouTube video streaming web based resources.

Resources	Yes	No	Total
YouTube	119(60%)	81(40%)	201(100%)
Google	161(81%)	39(19%)	201(100%)
Wikipedia	70(35%)	131(65%)	201(100%)
Yahoo search	33(16%)	168(84%)	201(100%)

Table 4.2.3 Frequency and percentage distribution on others resources used during clinical decision making among dental health workers

4.2.6. Association between knowledge with the use of internet based resources to support clinical decision

The relationship between knowledge with the use of internet based resources to support clinical decision is presented in Table 4.2.7.The result show statistical significant equal to p-value 0.000 between awareness on searching medical and dental information on PubMed with use internet based resources to support clinical decision, another significant association p-value equal to 0.000 on awareness on searching medical information via drug.com with use of internet based resources to support clinical decision.

Independent variables		**Dependent variable**	**P-value**
Knowledge	Search for professional medical and dental information	Use of internet based resources to support clinical decision	0.002
	Awareness on searching information using PubMed	Use of internet based resources to support clinical decision	0.0000
	Awareness on searching information using RxList	Use of internet based resources to support clinical decision	0.472
	Awareness on searching information using Medscape	Use of internet based resources to support clinical decision	0.001
	Awareness on searching information using Drug.com	Use of internet based resources to support clinical decision	0.000

Table 4.2.4: Association between knowledge with the use of internet based resources to support clinical decision

4.3. Attitude toward the use of online dental health databases and resources amongst dental health workers

Attitude were assessed based on Likertscale, the respondent who had positive attitude respond strongly agree and agree were combined into agree while the respondent who had ‘2the negative attitude respond strongly disagree and disagree were combined into disagree.

4.3.1. Attitude toward the use of online dental health databases and resources amongst dental health workers

There was high agreement amongst respondents regarding the use of online dental health databases and resources to support decision making this was significantly associated with reliability of the resource and the ability to resolve challenges in clinical decision making. Strongly agree with agree response were combined into agree and strongly disagree with disagree response were combined into disagree.

Table 4.3.1 Distribution of attitude toward the use of online dental health database and resources amongst dental health workers

Attitude about the use of online medical database		**AO Dental surgeon (N=10)**	**A0 BDS with specialty(N=2)**	**A0 BDT(N=60)**	**A0 BDT with specialty(N=4)**	**A1 BDT(N=125)**	**P-valule**
Internet based resources address my clinical decision making needs	**Agree**	90%(9)	100%	93%(56)	75%(3)	92%(114)	0.054
	Disagree	10%(1)	0%	0%	0%	8%(10)	
	Neutral	0%	0%	6.7%(4)	25%(1)	8%(1)	
Internet based resources are important part of my clinical practice	**Agree**	90%	50%	86.7%	75%	87.2%	0.057
	Disagree	0%	0%	1.7%	0%	17.6%	
	Neutral	10%	50%	11.7%	25%	2.4%	

Internet based resources resolve any challenges I have in clinical decision making	**Agree**	70%	100%	90%	25%	68.8%	0.000
	Disagree	10%	0%	3.3%	50%	20.4%	
	Neutral	20%	0%	6.7%	25%	18.4%	
I have confidence in the reliability of the information found on the internet based resources	**Agree**	60%	100%	96.7%	25%	60%	0.000
	Disagree	20%	0%	3.3%	50%	17%	
	Neutral	20%	0%	0%	25%	23%	
I believe the information provided on the internet based resources is beneficial to my patient	**Agree**	80%	100%	98.4%	100%	90.4%	0.417
	Disagree	0%	0%	1.6%	0%	6.4%	
	Neutral	20%	0%	0%	0%	3.2%	
I believe that having internet and computer in our dental services will facilitate proper use of online resources	**Agree**	90%	100%	98%	100%	98.4%	0.362
	Disagree	0%	0%	0%	0%	1.6%	
	Neutral	10%	0%	2%	0%	0%	
I don't depend on internet based resources to support my clinical decision all the time.	**Agree**	70%	0%	32%	75%	26.4%	0.001
	Disagree	0%	100%	57%	0%	51.2%	
	Neutral	30%	0%	11%	25%	22.4%	

4.3.2. Significant association between attitude questions and using internet based resources for taking clinical decision support

Significant associations were found between the use of internet based resources to address clinical decision making needs (p=0.000), support clinical decision all the time (p=0.000), importance in clinical practice (p=0.000), reliability of information provided (p=0.000) and belief that the resources were beneficial to the patient (p=0.000).

Independent variable	**Dependent variable**	**P-value**
Internet based resources address my clinical decision making needs	use of internet based resources to support clinical decision among dental health workers	P=0.000
I depend on internet based resources to support my clinical decision all the time		P=0.000
Internet based resources are important part of my clinical practice		P=0.000
I have confidence in the reliability of the information found on the internet based resources		P=0.000
I find the information provided by internet resources is clear to me		P=0.034
I believe the information provided on the internet based resources is beneficial to my patient		P=0.000

Table 4.3.2 Significance association between attitude questions and using internet based resources for taking clinical decision support

4.4. Usage of smart phone applications and online resources for consultation, clinical decision making and support amongst oral health care workers.

4.4.1. Usage of smartphone application for clinical decision making amongst respondents

The majority of the respondents 49.7% (N=100) were agree that they use smartphone application for clinical decision while 20.4% (N=41) disagree on the use of smartphone. With regard to professional qualifications 51.4% (N=62) of A1 dental therapist use smartphone application compared to 41.7% (N=25) for A0 dental therapists. The findings are summarized in the table below.

Dental qualification	**Use of smartphone application for clinical decision making**			
	Agree	**Disagree**	**Neutral**	**Total**
A0 Dental Surgeon	9(90%)	1(10%)	0%	10(100%)
A0 Dental Surgeon with specialty	1(50%)	0%	1(50%)	2(100%)
A0 Dental therapist	25(41.7%)	12(20%)	23(38.3%)	60(100%)
A0 Dental therapist with specialty	3(75%)	1(25%)	0%	4(100%)
A1 Dental therapist	62(51.4%)	27(21.6%)	36(28.8%)	125(100%)
Total	100(49.7%)	41(20.4%)	60(29.9%)	201(100%)

Table 4.4.1 Usage of smartphone application for clinical decision making amongst respondents

4.4.2. Usage of Smartphone and online resources for consultation amongst dental health workers

The majority of the respondents 49.7% (N=100) agree on the use of smartphone and online resources for consultation while 37.8% (N=76) disagree and 12.4% (N=25) neutral. With regard to professional qualifications 36% (N=45) of A1 dental therapist disagree at high level while A0 Dental therapist disagree at level of 25% (N=15). The findings are summarized in the graph below.

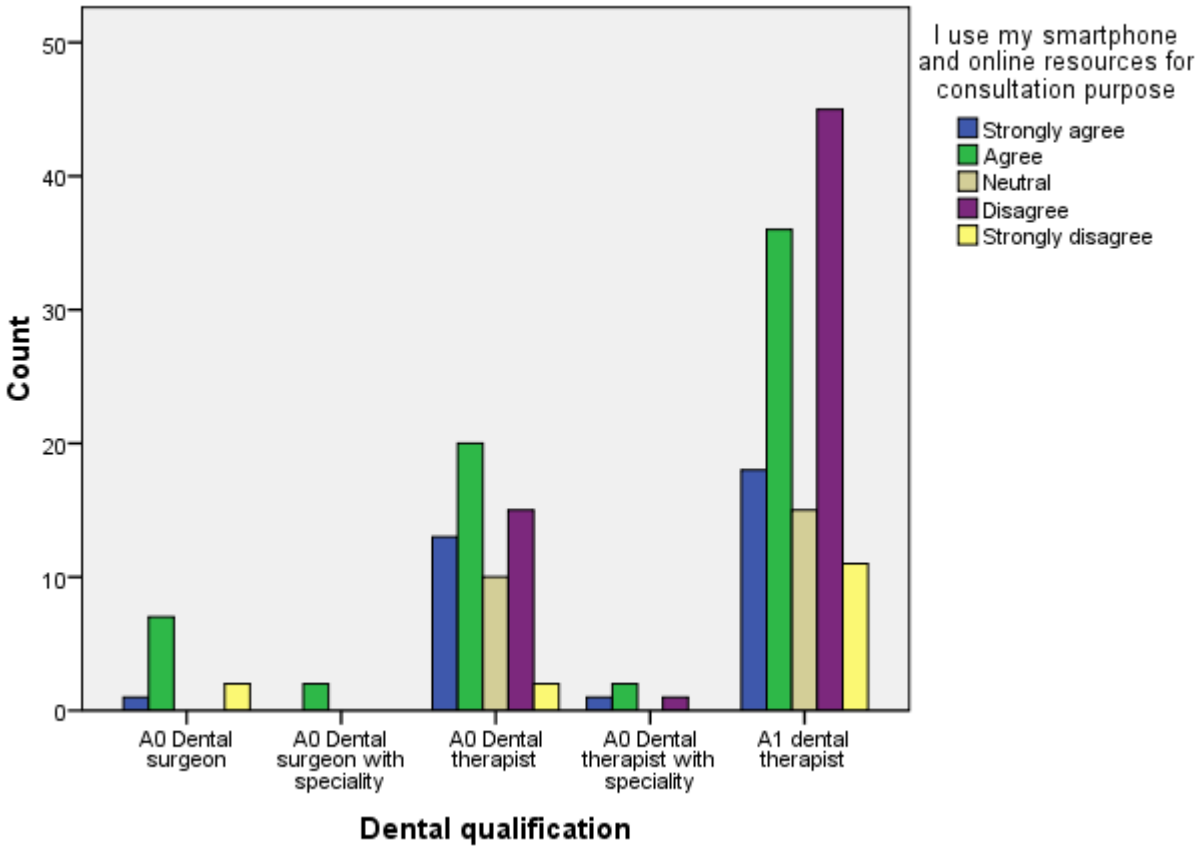

Figure 4.4.1 Distribution of smartphone usage and online resources for consultation amongst dental health workers

4.4.3. Usage of internet based resources to support clinical decision making amongst dental health workers

Distribution of the use of internet based resources to support clinical decision among dental health workers is presented in Figure 4.4.4.The finding reveal that among respondents 160 (80%) were using internet based resources to support their clinic decision making while 41 (20%) of dental health workers they don't use internet based resources to support their clinic decision making.

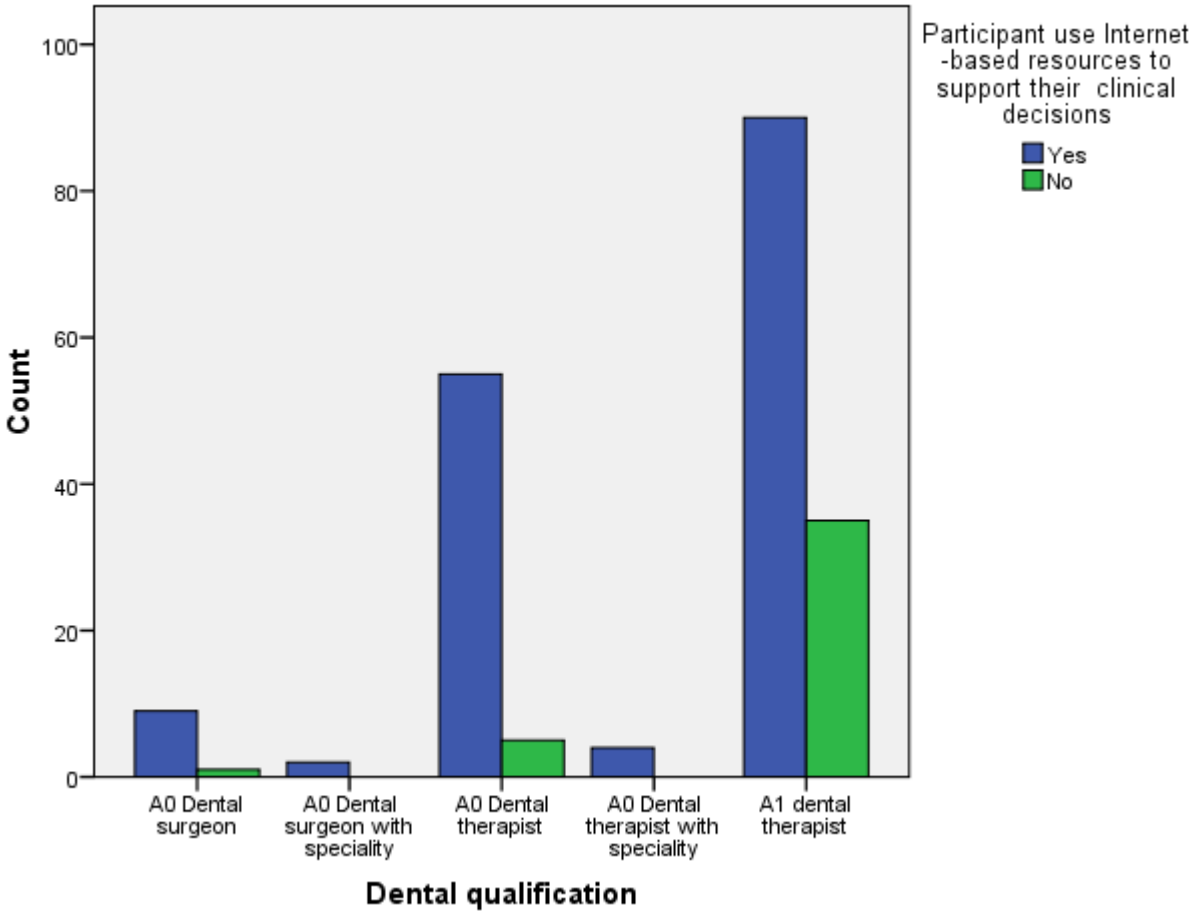

Figure 4.4.2 Distribution on the use of internet based resources to support clinical decision amongst dental health workers

4.4.4. Distribution of the information frequently search online amongst dental health workers

The majority of the respondents 70 (34.8%) were frequently search clinical procedure information while second searched information were related to drug prescription 50(24.8%) and the less searched information is drug interaction at 10(5%) of respondents, With regard to professional qualifications 42(33.6%) of A1 dental therapist have a high frequent on searching clinical procedure the same as A0 Dental surgeon 6(60%) of them searched for the clinical procedure.

Dental qualification	**Information frequently searched online**				
	Diagnostic	**Drug Prescription**	**Drug Adverse effect**	**Clinical procedure**	**drug interaction**
A0 Dental Surgeon(	1(10%)	2(20%)	0%	6(60%)	1(10%)
A0 Dental Surgeon with specialty	0%	0%	1(50%)	0%	0%
A0 Dental therapist	12(20%)	18(30%)	5(8.3%)	20(33.3%)	2(3.3%)
A0 Dental therapist with specialty	0%	0%	1(25%)	2(50%)	1(25%)
A1 Dental therapist	15(12%)	30(24%)	26(20.8%)	42(33.6%)	5(4%)
Total	28(13.9%)	50(24.9%)	33(16.4%)	70(34.8%)	10(5%)

Table 4.4.2. Distribution of the information frequently search online amongst dental health workers

4.4.5. DISTRIBUTION OF PARTICIPANTS BY USE OF INTERNET BASED RESOURCES FOR CLINICAL DECISION AND GENDER

Relationship between gender and the use of internet based resources during clinical decision taking is presented in Table 4.2.3.The result show that 107 (78%) of male among 137 respondents use internet based resources to support their clinic decision while 53 (83%) of female among 64 female use internet based resources to support their clinical decision. This finding reveals that female use internet based resources to support their clinic decision more than male.

Use of internet based resources to support clinical decision	Gender of the participants	
	Female	Male
Yes	83%(53)(83)	78%(107)
No	17%(11)	22%(30)
Total	100%(64)	100%(137)

Table 4.4.3: Distribution of participants by use of internet based resources for clinical decision and gender

4.4.6. Practice of dental health workers on accessing online dental health information

The time spending by dental health workers viewing online dental health information on the internet is presented in Table 4.4.3 .That shown that the majority of dental health workers equal to 99(49%) access internet resources for searching online medical and dental information to support their clinical decision less than 60 minutes, while 70(35%) viewing page between 60 min to 120 minute and 32(16%) of dental health workers access internet more than 2 hours for searching online medical and dental information to support their clinical decision making.

Table 4.4.4 Practice of dental health workers on accessing online medical and dental health information

How much time do you spend viewing pages on the internet?	Frequency	Percent
Less than 60 minutes	99	49%
60 min to 120 minutes	70	35%
More than 2 hours	32	16%
Total	**201**	**100%**

CHAPTER 5: DISCUSSION

5.0. INTRODUCTION

This study reports knowledge, attitude and practice of dental health workers toward the use of online medical database for taking clinical decision amongst all registered dental health workers in Rwanda. It emphasizes on registered dental health workers because those are the ones who had the active license to treat the patients, those who are not registered were excluded in this study because they had no license to work in Rwanda health facility. The Dental health workers are registered through Rwanda Allied Health Professional Council (RAHPC) and Rwanda Medical and Dental Council (RMDC), the RAHPC register all dental health workers except dental surgeon that are registered through RMDC. The result of this study provide a full reflection on the awareness of online health database and resources amongst all registered dental health workers, It reflect the attitude toward online dental health database and resources, the usage of mobile application and use of online resources for consultation during point of care in taking clinical decision.

5.1. Demographic data

The majority of the respondents were dental therapist 94% (N=189) compared to the dental surgeon equal to 6%(N=12), the reason for that different among dental health workers could be due to the Education background of Rwanda that has only one University that train dental health workers, since 1997 University of Rwanda (Former KHI) started level of training dental health workers at A1 Dental therapist. Beginning of 2012 University of Rwanda started to release Dental therapists with Bachelor Degree (A0), In 2013 University of Rwanda launched another program to train Dental surgeon but those are still to graduate. The shortage of dental surgeons is related to the lack of institution of training of dental surgeons. Among the total respondents 68% of the participants were male and 32% of the respondents were female. This result is almost similar to the study conducted among dental health workers that find that majority of respondents were male (79%) and 21% were female.(19) This can be related to lower female enrollment into science related courses at Secondary school and University levels.

The majority of respondents, 65% (130) were in the 31 to 40 years age group, this can be related on the average age of graduating in the university which is equal 22 to 24 according to the period of training of dental health workers, University of Rwanda started to train dental health workers in 1997 from that period up to now the average age of the respondents that trained within that period are in the range of 31 to 40 age group. Sixty five of dental health workers work in the urban area this similar to a study conducted to count health workers that shows that more than 75% of doctors, more than 60% of nurses and more than 58% of other health workers also live in urban areas.

5.2. Awareness amongst dental health workers of online oral health databases and resources.

This study shows that 75% dental health workers have awareness on searching professional medical and dental information during decision making. But this result does not mean that the dental health workers are accessing the accepted professional resources. It is very possible that some of the health provider use nonprofessional untrusted resources to support their clinical decision due to lack of knowledge of available trusted professional resources to support their decision that are available to them. Dental health workers are accessing untrusted non-medical and dental professionals resources to support their clinical decision as it show 81% of dental health workers were using Google to take support during point of care, this result is similar to the one found in the study aim to assess the information seeking behaviors of health sciences faculty one the use of online databases found that the majority of the respondents was utilized Google more often on daily basis.(35)

There was insufficient knowledge amongst dental health workers related on the awareness of specific smartphone application that contain medical and dental information to support their clinical decision as we see that 94% of the respondents own smart phone but the only 6% of dental health workers are aware about the specific mobile application for clinical decision support. This may indicate that dental health workers are using their smartphone for social purpose rather than supporting clinical decision making and awareness need to be enhanced of this smartphone capability.

There was low awareness of tools such as Pubmed, RxList, Epocrates compared to the study conducted in the United State aim on determining the primary medical database utilized to support clinical decision and result showed that 78.5% respondents use PubMed at least once a week this demonstrate that they aware on the function of the PubMed and also had a good practice to use that tools as to support their clinical decision and it might be associated with the use of online medical database during undergraduate training.(35)

We can consider Google as an entry point for identifying clinical decision tools, however the information found on this search engine are not trusted because some of the resources are posted by unknown or non-recognized authors without rigor of peer review the same can be apply to the use of YouTube to support their clinical decision. This study reveal that in general the dental health workers are aware of medical and dental information and are willingly to access the online information for getting support on their clinical decision but the challenge they consult the wrong resources which are not trusted resources only few dental health workers reveal that at least they access the trusted information like PubMed on the rate of 41%, only 1% of respondents are aware and have a positive for accessing RxList and the remaining 99% of dental health workers they are not aware about RxList database, Epocrates resources is the best resources that contain the dental information that can support dental health workers during clinical care but 0% of participants are aware about that. Drug.com which is the web based resources that contain drug prescription , drug interaction and drug allergy depend on the life status of the patients only 29% of dental health workers are aware and using it for decision making. Majority of dental health workers are able to retrieve information on the internet and almost all of them are having access to the internet and computer so the only challenge maybe related to the lack of training on the usage of the available trusted medical and dental resources than can be used during decision making.

5.3. Attitude toward online dental health databases and resources amongst Dental health workers.

The result on the attitude of dental health workers to the use of online medical database during decision making shows that 147(73%) agree and 37(18%) strongly agree that internet based resources address their clinical decision makings needs, the majority equal 90% of dental health workers disagree on depend on internet based resources to support their clinical decision all the time, which is good as health workers they were trained to treat and care their patients so it is clear ok depend on internet some time but not all the time. The result in this study shows that among dental health workers 52% agree and 35% strongly agree that internet based resources are important part of their clinical practice, 58% respondents believe that internet based resources can resolve any challenge they can face during making a clinical decision, 55% of respondents have confidence in the reliability of information found on the resources based on the internet, it show also that 57% agree or accept that the information provided by internet resources is clear for them and also beneficial to their patients. The majority of dental health workers have a true believe that use of some smartphone application during decision making can empower their decision taking during point of care as it have shown in this result that 38%(67) agree a'2nd 38%(16%) strongly agree.

The positive attitude in this study have been identified among all dental health workers as it shown that 115(57%) agree and 71(35%) strongly agree that having internet and computer in their dental services will facilitate proper use of online resources.

The statically significant of p-value equal to 0.000 have been identify between the use of internet based resources during clinical decision making with internet based resources address clinical decision making needs and with depend on internet based resources to support my clinical decision all the time.

The statically significant have been identified with the use of online medical database to support clinical decision where P value equal to 0.0000. The dental health workers who had negative attitude they don't depend on internet based resource to support their clinical decision were shown p value of 0.162 no statically significant with the use of internet based resources to support their clinical decision support.

5.4. Practice of dental health workers toward the usage of online medical databases and resources

This study showed that 67(38%) agree and 38(16%) strongly agree on the use of their Smartphone and online resources for consultation purpose and 78(39%) of the respondent use their Smartphone for clinical decision making and support but among dental health workers showed that only 12(6%) dental health workers were aware of medical and dental Smartphone application that can be used to support their clinical decision making while 184(94%) of dental health workers were not aware of the Smartphone application related to dental, this indicated to me according to the result found in this study have shown that among dental health workers 161(81%) were using Google, and also 119(60%) of the respondents were using YouTube video streaming web based resources, this proved to us that dental health workers they are not aware about the professional resources but they use their Smartphone to access Google and others common social website to access medical information.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSION

Though according to the above finding, it is concluded that, the reasons the dental health workers accessing the non-professionals resources to retrieval medical information during clinical decision support are related to the lack of awareness on the available professional smartphone application and professional web based resources that can help them to guide and support their clinical decision support. Emphasizing on the availability of computer and internet access the majority of dental health workers in this study have access to the internet any course that can be distributed online whether continuing professional development courses it can facilitate them to update their career and increase confidence in decision making. The only thing that needed is to organize special training on the searching professional medical information using the acceptable and specific medical and dental resources not Google and YouTube as it was mentioned that most of them they access Google and YouTube in order to get clinical decision.

6.2. RECOMMENDATION

I recommend the health facility that had dental services to organize the special workshop and CPD courses on available peer reviewed locally relevant online based resources and smartphone application for clinical decision support. I give my recommendation to the Rwanda Allied Health Professional council and Rwanda medical and dental council to start preparing online continuing professional development courses to update their registered health workers through their council using internet resources because almost all of them are having access to internet and computer, So they can gain credit and keep up to date through online courses. I recommend the development of offline package clinical decision making tool that support health workers without depend on the internet resources all the time. I recommend other research us to conduct a study on the implementation of continuing dental online education (CDOE) in Rwanda and determine requirement needed to have the full running online course that are available to the all registered dental health workers.

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APPENDICES

PARTICIPANT CONSENT FORM

Dear Participant,

I am Emmanuel Nzabonimana, Student in Masters of Science in Health Informatics in University of Rwanda. In order to be graduate with Master's Degree with Honor, I have to conduct a study entitled "Knowledge, attitute and practice of dental health workers toward the use of online medical database for clinical decision support" to which you are kindly requested to participate. Determining knowledge, attitude and practice of oral health care providers regarding online oral health databases and resources can provide important information on intrapersonal and extra personal barriers that exist towards their adoption in routine clinical practice and professional development. Once barriers are identified interventions can be proposed to lower or eliminate the barrier restrictions hence encouraging the uptake and utilization of these tools to enhance clinical decision making, support and professional development at provider level. The information will be kept confidentially.

There are no risks or discomforts that are anticipated from your participation in the study. Participation in this study is voluntary; refusal to participate will involve no penalty. Each participant is free to withdraw consent and discontinue participation in this project at any time without prejudice.

Agree…….. Disagree…….

QUESTIONNAIRE ENGLISH AND FRENCH VERSION

Knowledge, attitude and practices of dental health workers toward the use of online medical databases for clinical decision support

Dear Participant,
I am Emmanuel Nzabonimana, Student in Masters of Science in Health Informatics in University of Rwanda. I am carrying out a study on "Knowledge, attitude and practice of dental health workers toward the use of online medical database for clinical decision support".

The goal of the study is to determine knowledge, attitude and practice of dental health workers regarding online oral health databases and resources. I intend to obtain information on intrapersonal and interpersonal barriers that exist towards their adoption in routine clinical practice and professional development. Once barriers are identified, interventions can be proposed to lower or eliminate the barrier restrictions hence encourage the uptake and utilization of these tools to enhance clinical decision making and professional development of dental health workers.

Your participation is key to the success of the study. Any information you provide shall be kept confidential.
There are no risks or discomforts that are anticipated from your participation in the study.
Participation in this study is voluntary; refusal to participate will involve no penalty.

Each participant is free to withdraw consent and discontinue participation in this project at any time without prejudice.

* Required

I have read the above Information and fully understand that participation is voluntary with no risk or benefit to be earned *

- ◯ I consent
- ◯ I don't consent

Continue »

Q1. What is your age? *

- 20-30
- 31-40
- 41-50
- 51 and above

Q2. What is your Gender? *

- Male
- Female

Q3.Choose your work location *

- Urban area (Area located in Town or City)
- Rural Area (Area Located Outside town or city)

Q4.In which Province and District do you work? *

Write your District and Province at your working place?

Q5.Choose the typeof your health facility *

- Provincial Hospital
- Referral Hospital
- District Hospital
- Health Center
- Private Dental Clinic
- Private Polyclinic providing dental services

Q6. What is your qualification *

- A1 Dental Diploma in Dental Therapy
- A0 Dental Therapist
- A0 Dental Therapist with Specialist qualification
- A0 Dental Surgeon
- Specialist Dental Surgeon.
- Dental Lab Technician

Q7. How many years have you been in Practice? *

Choose one of the following options

- Below 5 Years
- Between 5-10 Years
- Above 10 Years

Q8. In which year did you graduate? *

Click the black arrow to choose from the list

Q9. Do you have access to a computer? *

- Desktop
- Laptop
- Both
- No access

Q10. Do you have a smartphone? *

- Yes
- No

Q11. Are you able to access Internet from your computer or smart phone? *

- Yes
- No

Q12. If Yes, how often do you use INTERNET? *

- Everyday
- 2-3 times a week
- once a week
- once or twice a month

Q13. How do you access the internet? *

	Yes	No
Local area network		
Modem		
WiFi		
Smartphone		
Don't know		

Q14. What do you use the internet for when you log in? *

	Yes	No
Reading Email	○	○
Social media	○	○
News & sport	○	○
Education	○	○
search for professional Medical & Dental information	○	○
others	○	○

Q15. Do you use Internet -based resources to support your clinical decisions ? *

- ○ Yes
- ○ No

Q16. If yes do you aware on the use of the following professional resources?

	Yes	No
Pubmed	○	○
RxList	○	○
Medscape	○	○
Drug.com	○	○
Epocrates plus	○	○
Medlineplus	○	○
Hinari	○	○
Uniprot	○	○
PharmGKB	○	○
others	○	○

Q17. What other internet based resources do you use to support your clinical decisions?

	Yes	No
Youtube	○	○
Google	○	○
Wikepedia	○	○
Yahoo	○	○
Other	○	○

Q18. How often do you access the resources you selected above? *

- Everyday
- 2-3 times per week
- Once a week
- once or twice a month
- Never

Q19. How much time do you spend viewing pages on the internet? *

- Less than 60 minutes
- 60 min to 120 minutes
- More than 2 hours

Q20. Choose the appropriate answer on the following statement based on Strongly disagree, Agree, Neutral, Strongly Disagree and Disagree *

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Internet based resources address my clinical decision making needs					
I depend on internet based resources to support my clinical decision all the time					
Internet based resources are important part of my clinical practice					
Internet based resources resolve any challenges I have in clinical decision making					
I have confidence in the reliability of the information found on the internet based resources					
I find the information provided by internet resources is clear to me					

I belive the information provided on the internet based resources is beneficial to my patient	○	○	○	○	○
I do not depend on internet based resources to support my clinical decision	○	○	○	○	○
I use my smartphone and online resources for consultation purpose	○	○	○	○	○
I use my smartphone application for clinical decision making and support	○	○	○	○	○
I believe that having internet and computer in our dental services will facilite proper use of online resources	○	○	○	○	○

Q21. What information do you frequently search for online *

- ○ Diagnostic
- ○ Drug prescription
- ○ Drug adverse effect
- ○ Clinical procedures
- ○ Laboratory indeces
- ○ Drug interaction
- ○ others

Q22. Are you aware of medical and dental smartphone applications that you can use to support your clinical decision? *

- ○ Yes
- ○ No

Q23. If Yes Specify the smartphone application you use to support your clinical decision

Write the application you usually use

« Back Submit

QUESTIONNAIRE FRENCH VERSION

La connaissance , l'attitude et les pratiques des professionnels de la santé dentaire vers l'utilisation de bases de données médicales en ligne pour le soutien à la décision clinique

Cher participant, Je suis Emmanuel Nzabonimana, Etudiant de Maîtres de la science en informatique de la santé à l'Université du Rwanda. Je mène une étude sur «La connaissance, l'attitude et la pratique des professionnels de la santé dentaire vers l'utilisation de base de données médicales en ligne pour le soutien à la décision clinique» .

Le but de l'étude est de déterminer les connaissances , attitudes et pratiques des travailleurs de la santé dentaire en ce qui concerne les bases de données et les ressources de santé en ligne par voie orale . Je souhaite obtenir des informations sur les obstacles intrapersonnels et interpersonnels qui existent en vue de leur adoption dans la pratique clinique de routine et le perfectionnement professionnel .

Une fois que les obstacles sont identifiés , les interventions peuvent être proposées pour réduire ou éliminer les restrictions de barrière donc encourager l'adoption et l'utilisation de ces outils pour améliorer la prise de décision clinique et le perfectionnement professionnel des travailleurs de la santé dentaire .

Votre participation est la clé du succès de l'étude. Toute information que vous fournissez sera gardée confidentielle.
Il n'y a pas de risques ou inconforts qui sont prévus à partir de votre participation à l'étude. La participation à cette étude est volontaire; refus de participer impliquera sans pénalité.

Chaque participant est libre de retirer son consentement et la participation discontinuer dans ce projet à tout moment sans préjudice.

* Required

J'ai lu l' information ci-dessus et de bien comprendre que la participation est volontaire sans risque ou un avantage à gagner *

- ◯ J'accepte
- ◯ Je n'accepte pas

Continue »

Q1. Quel âge avez-vous? *

- 20-30
- 31-40
- 41-50
- 51 et ci-dessus

Q2. Quel est votre sexe ? *

- Mâle
- Femelle

Q3. Choisissez votre lieu de travail *

- Zone urbaine (zone située dans la ville ou la ville)
- Zone rurale (zone Situé en dehors de la ville ou de la ville)

Q4. Dans quelle province et du district travaillez-vous ? *

Écrivez votre district et la province à votre lieu de travail ?

Q5. Choisissez le type de votre établissement de santé *

- Hôpital provincial
- Hôpital de Référence
- District Hospital
- Centre de santé
- Clinique dentaire privée
- Policlinique privée fournissant des services dentaires

Q6. Quelles sont vos qualifications *

- A1 Diplôme dentaire en thérapie dentaire
- A0 Thérapeute dentaire
- A0 dentaire thérapeute avec qualification de spécialiste
- A0 Chirurgie dentaire
- Spécialiste en Chirurgien dentaire .
- Technicien dentaire en Laboratoire

Q7. Combien d'années avez-vous été dans la pratique ? *

Choisissez l'une des options suivantes

- Moins de 5 ans
- Entre 5-10 ans
- Au-dessus de 10 ans

Q8. En quelle année avez-vous obtenu du diplôme ? *

Cliquez sur la flèche noire à choisir dans la liste

Q9. Avez-vous accès à un ordinateur ? *

- ◯ Ordinateur de bureau
- ◯ ordinateur portable
- ◯ Tous les deux

Q10. Avez-vous un téléphone intelligent (smartphone) ? *

- ◯ Oui
- ◯ Non

Q11. Êtes-vous capable d'accéder à Internet à partir de votre ordinateur ou un téléphone intelligent ? *

- ◯ Oui
- ◯ Non

Q12. Si oui , à quelle fréquence utilisez-vous Internet?

- ◯ Tous les jours
- ◯ 2-3 fois par semaine
- ◯ une fois par semaine
- ◯ une fois ou deux fois par mois

Q13. Comment accéder à Internet ? *

- ☐ Réseau local
- ☐ Modem
- ☐ Wifi
- ☐ Téléphone intelligent
- ☐ Je ne sais pas

Q14. Que voulez-vous utiliser Internet lorsque vous vous connectez ? *

	Yes	No
Lire email	◯	◯
Les médias sociaux (facebook , WhatsApp , twitter , etc)	◯	◯
Nouvelles & Sport	◯	◯
Education	◯	◯
Rechercher des informations Dentaire Professionnel et Medicale	◯	◯
Autres	◯	◯

Q15. Utilisez-vous des ressources basées sur Internet pour prendre des décisions cliniques ? *

- ◉ Oui
- ◉ Non

Q16. Si oui, vous faites connaissance d'utiliser l'une des ressources professionnelles suivantes ?

- ☐ Pubmed
- ☐ RxList
- ☐ Medscape
- ☐ Drug.com
- ☐ Epocrates Plus
- ☐ Medlineplus
- ☐ Hinari
- ☐ uniprot
- ☐ PharmGKB
- ☐ Other:

Q17. Quelles autres ressources Internet sur la base que vous utilisez pour appuyer vos décisions cliniques ?

- ☐ youtube
- ☐ Google
- ☐ Wikepedia
- ☐ Yahoo
- ☐ Other:

Q18. Combien de fois avez-vous accéder aux ressources que vous avez sélectionnée ci-dessus? *

- ◉ Tous les jours
- ◉ 2-3 fois par semaine
- ◉ Une fois par semaine
- ◉ une fois ou deux fois par mois
- ◉ jamais

Q19. Combien de temps passez-vous sur les pages Internet ? *

- ◉ Moins de 60 minutes
- ◉ 60 minutes à 120 minutes
- ◉ Plus de 2 heures

Q20. Choisissez la réponse appropriée à la déclaration suivante sur la base Fortement en désaccord , d'accord , neutre, Fortement en désaccord et en désaccord *

	Fortement d'accord	Se mettre d'accord	Neutre	Être en désaccord	Fortement en désaccord
Ressources internet sur base traitent mes besoins de prise de décisions cliniques	○	○	○	○	○
Je compte sur les ressources basées sur Internet pour soutenir ma décision clinique tout le temps	○	○	○	○	○
Les ressources basées sur Internet sont une partie importante de ma pratique clinique	○	○	○	○	○
Ressources Internet sur la base de résoudre tous les défis que j'ai dans la prise de décision clinique	○	○	○	○	○
Je fais confiance à la fiabilité de l' information sur les ressources Internet	○	○	○	○	○
Je trouve les informations fournies par des ressources Internet est clair pour moi	○	○	○	○	○
Je crois que les informations fournies sur les ressources basées sur Internet est bénéfique pour mon patient	○	○	○	○	○
Je ne dépends pas des ressources basées sur Internet pour soutenir ma décision clinique	○	○	○	○	○
J'utiliser mon smartphone et des ressources en ligne à des fins de consultation	○	○	○	○	○

J'utiliser mon application smartphone pour la prise de décision et de soutien clinique	○	○	○	○	○
Je crois que d'avoir Internet et l'ordinateur dans nos services dentaires sera Facilite la bonne utilisation des ressources en ligne	○	○	○	○	○

21. Quelles informations avez-vous rechercher fréquemment pour en ligne *

- ○ Diagnostique
- ○ prescription des médicaments
- ○ effet indésirable de médicaments
- ○ procédures cliniques
- ○ Indeces de laboratoire
- ○ Interaction médicamenteuse
- ○ autre

Q22. Connaissez-vous des applications smartphone médicaux et dentaires que vous pouvez utiliser pour soutenir votre décision clinique ? *

- ○ Oui
- ○ Non

Q23. Si oui, préciser l'application du téléphone intelligent que vous utilisez pour appuyer votre décision clinique

Écrivez l'application que vous utilisez habituellement

« Back Submit

IRB ETHICAL CLEARENCE

UNIVERSITY OF RWANDA

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 18/03/2016

NZABONIMANA Emmanuel
School of Public Health, CMHS, UR

Approval Notice: No 096 /CMHS IRB/2016

Your Project title ***"Knowledge, attitude and practice of dental health workers toward the use of online medical database for clinical decision support"*** has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahutu	UR-CMHS		X	
Dr Brenda Asiimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS		X	
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS		X	
Mr Kanyoni Maurice	UR-CMHS	X		
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS		X	
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS		X	
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 17th March 2016, **Approval letter has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months**.
You are responsible for fulfilling the following requirements:

EMAIL: *researchcenter@ur.ac.rw* P.O. Box: 3286, Kigali, Rwanda WEBSITE: http://cmhs.ur.ac.rw/

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 18th March 2016
Expiration date: The 18th March2017

Professor Kato J. NJUNWA
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

RECOMMENDATION FOR DATA COLLECTION

UNIVERSITY OF RWANDA

College of Medicine and Health Sciences
School of Public Health

OFFICE OF THE DEAN

RECOMMENDATION

This is to testify that **Mr Emmanuel NZABONIMANA** with registration number **215042331** is a last year student in Master's of Science in Health Informatics at the University of Rwanda, College of Medicine and Health Sciences, school of Public Health, during the academic year 2015- 2016. The student is doing research for final thesis titled: **"KNOWLEDGE , ATTITUDE AND PRACTICE OF DENTAL HEALTH WORKERS TOWARD THE USE OF ONLINE MEDICAL DATABASE FOR CLINICAL DECISION SUPPORT" .**

ALLIED HEALTH PROFESSIONAL COUNCIL(AHPC)/KIYOVU - NYARUGENGE

Any assistance rendered to him/her is highly appreciated

Yours sincerely,

Done at Kigali, on 16th March, 2016.

Prof. Manasse NZAYIRAMBAHO

Acting Dean

E-mail : principal.cmhs@ur.ac.rw Fax: +250 500014 Tel : +250585166 P.O. Box : 3286 Kigali – Rwanda Website: www.ur.ac.rw

UNIVERSITY OF RWANDA
College of Medicine and Health Sciences
School of Public Health

OFFICE OF THE DEAN

RECOMMENDATION

This is to testify that **Mr Emmanuel NZABONIMANA** with registration number **215042331** is a last year student in Master's of Science in Health Informatics at the University of Rwanda, College of Medicine and Health Sciences, school of Public Health, during the academic year 2015- 2016. The student is doing research for final thesis titled: **"KNOWLEDGE , ATTITUDE AND PRACTICE OF DENTAL HEALTH WORKERS TOWARD THE USE OF ONLINE MEDICAL DATABASE FOR CLINICAL DECISION SUPPORT" .**

RWANDA MEDICAL DENTAL COUNCIL(RMDC) / NYARUGENGE

Any assistance rendered to him/her is highly appreciated

Yours sincerely,

Done at Kigali, on 16th March, 2016.

Prof. Manasse NZAYIRAMBAHO

Acting Dean

E-mail : principal.cmhs@ur.ac.rw Fax: +250 500014 Tel : +250585166 P.O. Box : 3286 Kigali – Rwanda Website: www.ur.ac.rw

University of Rwanda
College of Medicine and Health Science
School of public Health
Masters of Science in Health Informatic
Emmanuel NZABONIMANA
Contact phone number : -(+250)783880746
E-mail : nzabaemmy@gmail.com

Date: January 19th 2016

RAHPC
On 28 MAR 2016
Ref. No
RECEIVED

To: The Director of Rwanda Allied Health Professions Council(RAHPC)

RE: Request permission for data collection among dental therapist registered within RAHPC

Dear Sir,

I am a student in Masters of Science in Health Informatics School of Public health University of Rwanda , I am doing Study on **Knowledge, attitude and practice of dental health workers toward the use of online medical database for decision support.**

I will collect data using online survey, I would like to **request telephone and email contact address of all registered dental therapist currently practicing in Rwanda** to facilitate my data collection as it will enable me to contact those who are at long distance and it will be complete hidden to public.

My study population shall cover licensed oral health care providers registered with the allied health professional council and the Rwanda Medical and Dental council and resident within Rwanda. My survey form for data collection are going to be online for to those who live far from kigali and paper self administered questionnaire for those who live within Kigali. The informed consent will be sent to their adress email.

By determining knowledge, attitude and practice of oral health care providers regarding online oral health databases and resources will provide important information on intrapersonal and extra personal barriers that exist towards their adoption in routine clinical practice and professional development. Once barriers are identified interventions can be proposed to lower or eliminate the barrier restrictions hence encouraging the uptake and utilization of these tools to enhance clinical decision making, support and professional development at provider level.

Yours sincerely,

Emmanuel NZABONIMANA

University of Rwanda
College of Medicine and Health Science
School of public Health
Masters of Science in Health Informatic
Emmanuel NZABONIMANA
Contact phone number : -(+250)783880746
E-mail : nzabaemmy@gmail.com
Date: March 28th 2016

To: The Director of Rwanda DENTAL COUNCIL

RE: Request permission for data collection among dental SURGEON registered in RMDC

Dear Sir,

I am a student in Masters of Science in Health Informatics School of Public health University of Rwanda , I am doing Study on **Knowledge, attitude and practice of dental health workers toward the use of online medical database for decision support.**

I will collect data using online survey, I would like to request **telephone and email contact address** of all registered Dental Surgeon currently practicing in Rwanda to facilitate my data collection as it will enable me to contact those who are at long distance and it will be complete hidden to public.

My study population shall cover licensed oral health care providers registered with the allied health professional council and the Rwanda Medical and Dental council and resident within Rwanda. My survey form for data collection are going to be online for to those who live far from kigali and paper self administered questionnaire for those who live within Kigali. The informed consent will be sent to their adress email.

By determining knowledge, attitude and practice of oral health care providers regarding online oral health databases and resources will provide important information on intrapersonal and extra personal barriers that exist towards their adoption in routine clinical practice and professional development. Once barriers are identified interventions can be proposed to lower or eliminate the barrier restrictions hence encouraging the uptake and utilization of these tools to enhance clinical decision making, support and professional development at provider level.

Yours sincerely,

POUR RECEPTION
ORDRE DES MEDECINS
ET DES DENTISTES DU RWANDA

Emmanuel NZABONIMANA

RESEARCH ETHICS CERTIFICATE

fhi360
THE SCIENCE OF IMPROVING LIVES

FHI 360

certifies that

Emmanuel Nzabonimana

has completed the

RESEARCH ETHICS TRAINING CURRICULUM

January 12, 2016