Barriers to restorative care as perceived by dental practitioners in Tanzania

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Objective To identify barriers to restorative care, as perceived by dental practitioners. ***Methods*** Of the total of 147 dental practitioners employed in regional and district government hospitals and municipal health centres, 138 completed a pre-tested questionnaire: a response rate of 94%. Factor analysis was performed to extract barrier factors. Chi-square test was used to test the influences of independent variables on discrete dependent variables, and ANOVA was used to test the influences of independent variables on continuous dependent variables. ***Results*** *Knowledge of patients* and *beliefs of patients* were perceived as the most important barriers. Others were *financial, motivation of practitioners*, *dentistry looked down upon by administration* and *patients' fear of noise from drill*. Practitioners who worked in high and medium economic zones perceived *patients' fear of noise from drill* as a barrier to restorative care more than their counterparts in low economic zones. Practitioners who worked in low economic zones perceived *dentistry looked down upon by administration* as a barrier to restorative care more than colleagues in high and medium economic zones. ***Conclusions*** *Knowledge* and *beliefs of patients about restorative care* were the two main factors that hindered restorative care, as perceived by dental practitioners in Tanzania. Organized information provision to the population and regular continuing education meetings for practitioners on restorative and preventive care, plus adoption of Atraumatic Restorative Treatment in daily clinical work are considered appropriate in addressing these barriers.

Key words: Atraumatic Restorative Treatment, barriers to restorative care, developing country, practitioners' perceptions, Tanzania.

Introduction

The main reason for patients' attendance at dental clinics in Tanzania was for relief from pain caused by advanced stages of dental caries (van Palenstein Helderman and Nathoo, 1990; Mosha and Scheutz, 1993). Moreover, several investigators have reported tooth extraction due to advanced stages of dental caries as the main cause of tooth loss among Tanzanian population, even in older age groups (Baelum and Fejerskov, 1986; Mosha and Lema, 1991; Sarita *et al*., 2004; Mumghamba and Fabian, 2005; Kida *et al*., 2006). Therefore, the policy documents in the Ministry of Health have consistently pointed to the need for raising the rate of restorative care, to reduce tooth loss and its consequences among Tanzanians, for improved quality of life (COHU, 1988; COHU, 2002). Nevertheless, clinic treatment summaries for the year 2005 do not show any significant rise in the amount of restorative care in government dental clinics compared to previous years (COHU, 2006). This indicates that there are barriers that may be hindering the implementation of restorative care in Tanzania.

Guay (2004) underscored the need to understand clearly the barriers to care affecting a particular population and concluded that failure to understand these barriers and address them adequately often results in limited success in enhancing access to dental care in that population. Likewise, Tugwell *et al*., (2006) advocated the importance of identifying barriers and facilitators at all levels, including community, patient, practitioner, and policy-maker, for successful implementation of a care programme. Thus, for restorative care to be successfully increased in Tanzania, the barriers hindering it need to be thoroughly studied and understood.

Studies conducted elsewhere have indicated that attitudes of practitioners (Brennan and Spencer, 2002; Pine *et al*., 2004; Brennan and Spencer, 2005) and professional uncertainty and lack of commitment (Hallberg *et al*., 2004) might constitute barriers to implementing oral care. In addition, institutional barriers, including resource issues, have also been shown to hinder the provision of oral health services (Ramos-Rodriguez *et al*., 2004). These studies indicate that barriers to oral care may arise both from practitioners' and from institutional perspectives. Since dental practitioners have an important role to play in restorative care, and no studies on this topic have previously been documented for Tanzania, research to identify barriers to restorative care, as perceived by dental practitioners, was undertaken. The aim of this study was to elicit information about the barriers to restorative care as perceived by dental practitioners working in the government health facilities in Tanzania. The results of this research will enrich understanding regarding barriers to restorative care in Tanzania and shed light on possible ways of addressing them.

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Method

Written approval for this study was obtained from the Ethical Committee of the Muhimbili University College of Health Sciences, through letter with reference MU/RP/AEC/VOL. II/130. The target population comprised all dental practitioners working in regional and district government hospitals and in health centers in mainland Tanzania. By 2003, 147 dental practitioners were working in these institutions: 22 Dental Officers (DO), 70 Assistant Dental Officers (ADO) and 55 Dental Therapists (DT). Since the total number of dental practitioners was small, no sampling was needed.

No validated questionnaire on barriers to restorative care as perceived by dental practitioners in Tanzania could be obtained at the time of planning the present investigation. Therefore, one had to be constructed. A preliminary questionnaire consisting of open-ended questions was administered to 34 dental practitioners in three regions. Practitioners were requested to list constraints/obstacles in relation to restorative care, that they had been experiencing while working as dental practitioners.

The listed obstacles were used to construct a closed-ended draft questionnaire. Respondents were asked to rank the extent to which they perceived an item to contribute to low restorative care in Tanzania, using a four point scale (not at all = 1, less extent = 2, some extent = 3, great extent = 4). The draft questionnaire was then administered to these dental practitioners, who were asked to rate, according to their perceptions, the extent to which each of the listed obstacles would affect restorative care. Seventeen (17) barriers were rated by at least 2/3rds of all respondents as having to "some extent" or "great extent" an effect on restorative care. These barriers were used to construct the final closed-ended questionnaire for administration to all dental practitioners in Tanzania.

Addresses of dental practitioners working in government health facilities were obtained from the office of the Chief Dental Officer in the Ministry of Health. As this list was last updated in 2001, there was a need to confirm the names, numbers and working stations of dental practitioners in each region. This was done by phoning regional dental officers, who corrected for the names, working stations and qualifications by writing short messages through mobile phone services or through e-mail messages.

A pre-tested questionnaire, introductory letter and stamped envelope for returning the completed questionnaire were mailed to each dental practitioner in mainland Tanzania. A reminder letter, questionnaire and stamped envelope were sent to all those who had not returned the questionnaires within two months and, lastly, after four months.

All data were entered into the computer using SPSS software, Version 11. After the data had been checked for accuracy, they were transferred to SAS software (SAS Institute, Cary, NC, USA) for statistical analysis by the statistician (JM), of the College of the Dental Sciences of the Radboud University Nijmegen, in the Netherlands.

The questionnaire was developed from the items that were elicited from 34 dental practitioners in three pilot regions. A closed-ended questionnaire was pre-tested by these practitioners, who checked and counterchecked the wording of the questions for meaning and clarity.

In addition, a test-retest reliability assessment of the questionnaire was carried out, by administering the questionnaire twice to a sample of 67 practitioners not employed in the pilot regions. Two out of 88 questions differed between the two measurements. The test retest correlation coefficients of the two questions were 0.93 and 0.99. The Cronbach's α for the factors constructed by factor analysis ranged from 0.60 to 0.85 (Table 1).

The independent variables used in this study were: economic zone (low, medium, high), gender (male/female), working experience ($\leq$5 years, 6-15 years; 16+ years) and qualification (DO, ADO, DT). Age was not used, because it was felt that in this study working experience was likely to be a more important time factor.

Factor analysis using principle components analysis with varimax rotation was used to extract four barrier factors from 15 items in the questionnaire. These were *beliefs of patients, knowledge of patients, financial barriers,* and *motivation of practitioner* (Table 1). The two single-item barriers that were not included in the four factors listed above were *dentistry is looked down by administration* and *patients' fear of noise from drill.* To facilitate ranking of barriers, mean scores were calculated and tested for differences between independent variables, using mixed procedure for differences of least squared means. A significant difference was set at p <0.05.

The two single item barriers were dichotomized by merging "not at all" + "less extent" into "no contribution" and "some extent" + "great extent" into "contribute". The Chi-square test was used to test for differences between the single item barriers and independent variables. Since the two single items showed statistically significant chi-square values at p <0.05, they were each entered in a multivariate logistic regression model (enter method) using the four independent variables as predictor variables.

Results

Of the total population of 147 dental practitioners, 138 responded to the questionnaires. This resulted in an overall response rate of 94%, split into 91%, 91%, and 98% for dental officers, assistant dental officers and dental therapists, respectively.

Table 2 shows the distribution of respondents by demographic characteristics. Female practitioners constituted 24.6% of the respondents. Given the number of regions in each zone, high economic zones had more practitioners per region than other zones. Most of the practitioners were either assistant dental officers (n=64) or dental therapists (n=54). Only 20 (14.5%) were dental officers.

The mean scores for the four barrier factors and the two single item barriers are shown in Table 3. *Knowledge of patients* (mean=3.5) and *beliefs of patients* (mean= 3.5) had the highest scores. The mean scores for these two barriers did not differ significantly from each other, but they were statistically significantly higher than those of the other barriers (*p* < 0.0001). The barrier perceived to have the least effect was *patients' fear of noise from drill.* It had a statistically significant lower mean score than all other barriers (p < 0.001). Respondents from high economic zone had statistically significant higher mean value for barrier "*patients being afraid of noise*

Table 1. Factor barriers extracted (italic), items from which they were derived and their internal consistency (Cronbach's alpha)

Factor Barrier	Cronbach's α
Beliefs of patients	0.60
- patients prefer extraction	
- patients seek care late	
- patients have wrong beliefs on restorations	
Knowledge of patients	0.75
- patients lack knowledge on restorative care	
- patients don't know the importance of restorative care	
- patients lack knowledge on the importance of early treatment	
- patients have no habits for seeking regular check-ups	
Financial	0.85
- equipment is very expensive	
- equipment is out of order	
- lack of funds to purchase equipment	
- lack of dental materials for restorative care	
- dental materials are expensive	
- lack of funds to purchase dental materials	
Motivation of practitioners	0.66
- Lack of incentives in offering opportunities for continuing education in restorative care	
- Lack of incentives for restorative care on part of dental practitioners	

Table 2. Distribution of respondents by independent variables

Demographic variable	Number	Percentage
Gender		
Male	104	75.4
Female	34	24.6
Zone		
High (4 regions)	65	47.1
Medium (12 regions)	51	37.0
Low (4 regions)	22	15.9
Working experience		
< 6 years	31	22.4
6-19 years	56	40.6
20+ years	51	37.0
Qualification		
dental officer	20	14.5
assistant dental officer	64	46.4
dental therapist	54	39.1

from drill" than their counterparts from low economic zone (p < 0.05). There were no statistically significant differences in mean barrier scores between gender, qualification, and working experience.

The percent distributions of respondents, by economic zone, gender, qualification and working experience for the two single-item barriers, *patients being afraid of noise from drill* and *dentistry is looked down by administration,* are presented in Table 4. Proportionately more practitioners employed in clinics in low economic zone perceived *dentistry is looked down by administrators* as a barrier to restorative care, compared to practitioners

employed in clinics in high and medium economic zones (p= 0.026). However, statistically significant more practitioners employed in high and middle economic zones perceived *patients being afraid of noise from drill* as a barrier to restorative care than did those in low economic zone (p= 0.022).

Logistic regression odds ratios of the two single item barriers *dentistry being looked down by administration* and *patients afraid of noise from drill* for independent variables economic zone, gender, qualification and working experience are shown in Table 5. Practitioners working in clinics in high and medium economic zones were more likely to perceive *patient being afraid of noise from drill* as barrier for restorative care than their counterparts from low economic zone (OR=0.32; CI 0.1-0.9).

Discussion

The literature could not provide the measuring instrument for assessing barriers to restorative care as perceived by dental practitioners working under situations found in Tanzania. Therefore, the assessment instrument had to be developed. Unfortunately, the validity of the newly constructed questionnaire could not be determined, as no such instrument for use in African populations existed. Face validation had been carried out during the instrument development process. On the basis of the high reliability values and the face validation, this questionnaire was judged to be valid enough for use in the present study. The data were derived from 94% of the total population of dental practitioners in government services. Therefore, the results from this study present a true reflection of the opinions of dental practitioners regarding barriers to restorative care in Tanzania.

Table 3. Mean and standard deviations (sd) for barriers by economic zone, gender, qualification and working experience

	Knowledge patient	Beliefs patient	Financial barriers	Motivation of practitioners	Dentistry being looked down by administration	Patients afraid of noise from machines
	Mean (sd)	Mean (sd)	Mean (sd)	Mean (sd)	Mean (sd)	Mean (sd)
Economic zone						
High (n=65)	3.5 (0.5)	3.4 (0.5)	2.8 (0.7)	2.9 (0.8)	2.6 (1.1)	2.6 (0.7)[d]
Medium (n=51)	3.5 (0.6)	3.5 (0.5)	2.8 (0.7)	2.9 (0.9)	2.8 (1.0)	2.4 (0.8)
Low (n=22)	3.6 (0.6)	3.4 (0.6)	2.8 (0.7)	3.1 (0.7)	3.0 (1.2)	1.8 (0.7)[e]
Gender						
Male (n=104)	3.5 (0.5)	3.4 (0.5)	2.8 (0.7)	3.0 (0.8)	2.7 (1.1)	2.3 (0.9)
Female (n=34)	3.5 (0.6)	3.5 (0.5)	2.9 (0.7)	2.9 (0.9)	2.6 (1.0)	2.7 (0.8)
Qualification						
Dental Officer (n=20)	3.6 (0.5)	3.5 (0.4)	2.9 (0.5)	3.1 (0.6)	2.8 (1.0)	2.3 (0.7)
Assistant Dental Officer (n=64)	3.5 (0.6)	3.4 (0.6)	2.7 (0.8)	2.9 (0.9)	2.6 (1.1)	2.3 (0.8)
Dental Therapist (n=54)	3.5 (0.5)	3.5 (0.5)	2.9 (0.7)	3.0 (0.8)	2.8 (1.1)	2.5 (0.9)
Working experience						
1-5 yrs (n=31)	3.6 (0.5)	3.7 (0.5)	3.0 (0.7)	3.0 (0.7)	2.9 (1.0)	2.6 (0.9)
6-19 yrs (n=56)	3.5 (0.6)	3.4 (0.6)	2.7 (0.7)	2.9 (0.9)	2.8 (1.1)	2.3 (0.9)
≥20 yrs (n=51)	3.5 (0.6)	3.4 (0.5)	2.8 (0.7)	3.0 (0.8)	2.6 (1.1)	2.3 (0.8)
Overall (n=138)	3.5 (0.5)[a]	3.5 (0.5[a]	2.8 (0.7)[b]	3.0 (0.8)[b]	2.7 (1.1)[b]	2.4 (0.7)[c]

Mixed procedure for differences of least squares means [de] $p < 0.05$, [bc] $p < 0.001$, [ab, ac] $p < 0.0001$

Table 4. Percent distribution of respondents by single item barriers by economic zone, gender, qualification and working experience

	Dentistry looked down by administration			Patients afraid of noise from machines		
	% perceiving that it contributes	χ^2	p	% perceiving that it contributes	χ^2	p
Economic zone						
High +Medium (n=116)	60.7	7.27	0.026	49.1	5.21	0.022
Low (n=22)	77.3			22.7		
Gender						
Male (n=104)	64.4	0.80	0.37	42.3	1.17	0.28
Female (n=34)	55.9			52.9		
Qualification						
dental officer (n=20)	65.0	0.44	0.80	35.0	0.94	0.63
assistant dental officer (n=64)	59.4			46.9		
dental therapist (n=54)	64.8			46.3		
Working experience						
1-5 yrs (n=31)	71.0	3.23	0.20	45.2	0.00	0.99
6-19 yrs (n=56)	66.1			44.6		
≥20 yrs (n=51)	52.9			45.1		

Table 5. Logistic regression odds ratios for barrier dentistry being looked down by administration and patients afraid of noise from drill for independent variables zone, gender, qualification and working experience

Independent variable	Dentistry being looked down by administration	Patients afraid of noise from drill
Zone		
High and Medium/low	2.37 (0.8-7.0)	0.32 (0.1-0.9)*
Gender		
Male/female	0.72 (0.3-1.7)	1.33 (0.6-3.0)
Qualification		
dental officer/dental therapist	0.75 (0.2-2.5)	1.49 (0.5-4.9)
assistant dental officer/dental therapist		
	0.93 (0.4-2.3)	0.98 (0.4-2.4)
Working experience		
< 6 years/20+ years	0.38 (0.1-1.2)	1.15 (0.4-3.4)
6-19 years/20+ years	0.54 (0.2-1.2)	1.09 (0.5-2.4)

* $p < 0.05$

The two most influential barriers identified in the present study were *knowledge of patients* and *beliefs of patients*. These barriers are most probably due to lack of formal ways of educating people about oral health care, including restorative care. Tanzania has no formal ways of educating people on issues related to oral health care. This creates a knowledge vacuum among people, which can be filled by speculations and hearsay leading to wrong perceptions about oral health. Mass media communication has recently developed adequately in Tanzania. Therefore, the Ministry of Health could use the mass media to educate people about oral health, including restorative care. In addition, dental practitioners could utilize the opportunities available when treating dental patients, to educate them about restorative and preventive care. These two methods of education should impart the correct knowledge about restorative care to large sections of the Tanzanian population.

Financial barriers can be overcome by heavy investment in traditional dentistry. However, given the economic situation of Tanzania, it is likely to take very many years to achieve this. The only feasible alternative method of combating *financial barriers* to restorative care is the use of appropriate technology. Atraumatic Restorative Treatment (ART) has been shown to be an appropriate approach for managing dental caries in communities that cannot afford traditional dental care (Frencken *et al*., 1996; Estupiňàn-Day *et al*., 2006). It is, therefore, high time that the Ministry of Health in Tanzania seriously considers adopting the ART approach for managing dental caries in clinics countrywide.

Adopting the ART approach would also address the barrier *patients' fear of noise from drill*, because ART uses hand instruments only and this has been shown to be patient-friendly and less pain-provoking than traditional restorative care, which uses rotary equipment (Rahimtoola and Van Amerongen, 2002; Schriks and Van Amerongen, 2003; Mickenautsch *et al*., 2007a). The problem of dentistry being looked down upon by the administration could easily be solved once delivery of restorative care has increased. The administration would then consider dentistry from a different perspective. Currently, dentistry

is known as a tooth pulling profession involving limited skills. With the introduction of ART, practitioners would be able to restore teeth and, therefore, would become health care providers who treat, rather than extract, teeth. This would certainly raise their levels of job satisfaction and professional status because they would receive more respect from patients, the administration and the community in general.

Motivation of practitioners can be improved by the Ministry of Health in collaboration with the School of Dentistry, through organizing regular continuing education meetings about relevant topics. Training in ART could be one of the first topics to be covered.

The proposed means of overcoming the barriers discussed in the preceding paragraphs need to be undertaken concurrently. In South Africa, for example, the ART approach was introduced before barriers were identified and solved. Consequently, the ART approach did not pick up as smoothly as had been expected (Mickenautsch *et al*., 2007b).

More practitioners working in clinics in high and medium economic zones than those working in clinics in low economic zones perceived *patients being afraid of noise from drill* as a barrier to restorative care. This is most probably because clinics in low economic zones are poorly equipped. Obviously a practitioner experienced in using rotary instruments, is better placed to evaluate whether or not the use of drilling machines is a barrier. On the other hand, practitioners working in clinics in low economic zones were more likely to perceive *dentistry is looked down by administration* as a barrier to restorative care than were those working in clinics in high and medium economic zones. Again the reason most probably was related to the difference in level of equipment. The clinics in low economic zones have only a dental chair and a few pairs of extraction forceps, whereas in medium and high economic zones, instruments and equipment are found more frequently, and in abundance.

It was concluded that *knowledge* and *beliefs of patients about restorative care*, were the two main factors that hindered restorative care, as perceived by dental practitioners in Tanzania. Providing organized information on

restorative care to the population and regular continuing education to practitioners on restorative care and adoption of ART in daily clinic work is considered an appropriate way of overcoming these barriers.

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