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If Late, then Never or Not likely: Uptake of Orientation and Mobility Rehabilitation Training (OMRT) Among Visually Impaired Older Adults

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Abstract

Background: Visually impaired people have challenges with outdoor mobility, which underscores the need for orientation and mobility rehabilitation training (OMRT). However, awareness and uptake of OMRT among blind people remain very low in Nigeria. The study investigated the association of demographic, physical, and visual impairment-related variables with awareness and uptake of orientation and mobility rehabilitation training (OMRT) in Nigeria

Methods: A cross-sectional survey of 361 visually impaired people aged 60 years and over, with best-corrected visual acuity ≤ 20/80 (0.6 LogMAR). The Timed Up and Go (TUG) test was used to assess the risks of falling. Multiple logistic regression was used to analyse predictors of awareness and uptake of OMRT

Results: Only 26.88% of those who were aware of OMRT reported accessing Orientation and mobility rehabilitation training (OMRT). The duration of visual impairment (p=0.016), awareness of the cause of Low Vision (p=0.043), and being at the risk of falls (p < 0.001), were significantly associated with taking-up OMRT.

Conclusion: Prolonged delays in referrals for OMRT are a potential cause of apathy towards the uptake of OMRT.

Keywords

Orientation, mobility, rehabilitation, visual impairment, older adults.

Introduction

The term "vision rehabilitation" includes a wide range of professional services allowing people who are blind or have low vision to live independently and maintain a good quality of life. Orientation and mobility rehabilitation training (OMRT) is an important component of vision rehabilitation often provided by Certified Orientation and Mobility Specialists (COMS). Through OMRT, individuals with visual impairment learn safe and independent indoor and outdoor travel skills enabling them to ambulate and negotiate the environment safely and independently (Goldschmidt, 2018). The training includes the use of a long cane, electronic travel devices, public transportation, a sighted guide, or a dog guide. OMRT can enable visually impaired adults to learn orientation and mobility skills needed to maintain travel independence and compensate for reduced visual information. Orientation refers to the ability to recognize and establish a position in relation to the environment while mobility is the ability to move in an orderly, efficient, and safe manner through the environment (Chang et al., 2020). Orientation and mobility training represents an essential tool for independent functioning and

participation of partially-sighted adults (Ballemans et al., 2011). There is evidence that visually-impaired older adults benefit from orientation and mobility training by acquiring skills for the use of travel aids (e.g. long cane or guide dog) and show improvements in independent functioning (Binns et al., 2012). Successful outcomes following orientation and mobility training also include improved mobility, reduction of falls or accidents, increased walking speed (Virgili & Robin, 2010), reduce depressive symptoms (Roets-Merken et al., 2015), and improved social participation and quality of life (Chang et al., 2022).

Many studies on how visual impairment affects activities of daily living suggest that some visually impaired people do not only have challenges with carrying out their daily activities but are also faced with significant challenges in outdoor mobility (Ajayi et al., 2020; Brouwer & Sadlo, 2008). Mobility restrictions associated with visual impairment have been identified as a hindrance to participation in social activities and social engagements (Patel et al., 2020). Some studies suggest that the prevalence of loneliness and social isolation among visually impaired adults is much higher than their sighted peers due to reduced mobility (Alma et al., 2011). There is also evidence suggesting that the social circle of several visually impaired people is often reduced and limited to mostly relatives and neighbors as poor mobility negatively affects their ability to maintain face-to-face social contacts and limits their social outings (Tolman et al., 2005; Gusi et al., 2008). The fear of falls is another consequence of visual impairment which negatively affects mobility and reduces confidence for physical movement in unfamiliar places, among visually impaired people, but is largely overlooked in research. Although many older adults are prone to mobility problems and falls due to frailty associated with aging (Cuevas-Trisan, 2017), visually impaired individuals are at higher risk of falling (White et al., 2015; Adams et al., 2018). Unfortunately, many blind and visually impaired (BVI) persons in Nigeria remain either unaware of how to access OMRT or have significant challenges with seeking orientation and mobility rehabilitation services (OMRS).

The use of public transport or walking without a guide remains a herculean task for many individuals living with visual impairment in Nigeria. There is a remarkable lack of inclusive means of transportation that caters to the needs of visually impaired people because the mainstream public transportation facilities are often not accessible for individuals living with visual impairment (Tunde-Ayinmode et al. 2011). The absence of walking kerbs and textured paving or sidewalks, and widely open drainages make the physical environment inaccessible for blind users of white canes. In addition, Nigeria is yet to enact white cane legislation to grant blind and visually impaired people the right of way. Although there is no legislation against the use of dog guides in Nigeria, their use in O&M among blind people is rare – perhaps due to the predominance of a culture of aversion to traveling with dogs in public transportation. Often, travelers with dog guides are denied access to public buses and/or taxi services due to public perception of dogs as menacing and perceived risks to safety. With other alternatives (such as white canes), OMRT could enhance the development of independent mobility. There is a paucity of research investigating BVI individuals' O&M training-seeking behavior, especially where BVI persons are informed about it or referred for OMRT but choose to not attend the training, even when it is offered at no cost. This study examined OMRT awareness and participation levels among visually impaired adults in Nigeria.

Methods

Study population

Participants were recruited from 18 registered eye clinics in the metropolitan city of Lagos state and Delta state in Nigeria. A total of 361 visually impaired people aged 60 years and over were contacted from 12 private eye clinics and 6 ophthalmology clinics in government hospitals in Delta (a Southeast state) and Lagos (a state located in the Southern part) of Nigeria. Table 1 shows the demographic characteristics of the participants. The private clinics included 8 randomly selected clinics from four Local Government Areas (LGAs) in Lagos state and four private clinics also randomly selected, from 2 local government areas in Delta state. The participants from the government

Table 1: Demographic Characteristics of Participants

		N	%
Gender			
Male		159	44.04
Female		202	55.96
Age			
60 - 70		172	47.65
>70 - 80		107	29.64
> 80⁺		82	22.71
Education			
Primary or None		213	59.00
Secondary		103	28.53
Post-Secondary		45	12.47
Years of living with visual Impairment			
0-5 years		172	47.65
>5-10		106	29.36
>10		83	22.99
Cause of Visual Impairment			
Optic neuritis	RE	18	4.99
	LE	26	7.20
Diabetic retinopathy	RE	25	6.93
	LE	23	6.37
Advanced Glaucoma	RE	73	20.22
	LE	77	21.33
Age-related macular degeneration	RE	68	18.83
	LE	71	19.67
Eye Injury/Trauma	RE	19	5.26
	LE	10	2.77
Cornea Dystrophy	RE	13	3.60
	LE	15	4.16
Trachoma	RE	18	4.99
	LE	19	5.26
Retinitis Pigmentosa	RE	22	6.10
	LE	25	6.92
Complicated Cataract	RE	37	10.24
	LE	27	7.48
Unknown Cause	RE	68	18.84
	LE	68	18.84

hospitals were drawn from ophthalmology clinics in 4 LGAs in Lagos state and 2 public (government-owned) hospitals in Delta State, Nigeria. We identified and contacted the Heads and Clinical directors of the eye clinics for debriefing about the purpose of the study as well as the potential benefits of the study. Initial contacts were made via telephone calls, and were subsequently followed up with written communication seeking approvals to conduct the study in the identified study sites. There were subsequent follow-up meetings leading up to the application for formal approval to conduct the study. During the meetings, we were afforded an opportunity to interface with some of the members of the various clinics and hospitals. These meetings allowed sharing of detailed information about the study as well as defining processes for participant recruitment, data confidentiality, data analysis, and ethical conduct of the study. After these meetings, permission to recruit participants from the clinics was granted. Our research sample was therefore one of convenience. The study typically gathered data from structured survey questionnaires read aloud to blind and partially sighted participants as well as through past clinical records of participants' relevant clinical examinations (such as visual acuity values) with the participants' consent. The extent of visual field loss was, however, not taken as all participants were already registered visually impaired persons. While the authors acknowledge that the range of a visual field could play a crucial role in obstacle and drop-off detection, participants' visual field information was not taken regardless. This was because the study focused on the extent of central vision loss, and visual acuity is traditionally used as the primary indicator of the magnitude of vision loss. Another reason for not taking the visual field information was that a majority of our participants had significant central vision loss, and it is difficult to obtain reliable automated visual field assessment as their eyes cannot fixate and immobilize on a target.

Ethics

The research was commissioned by the Delta State School of Health. In addition, the Institutional Review Boards of the State Health Management Boards granted ethical approval for the study. The study was conducted following institutional and national guidelines for the conduct of research with human subjects. All data were handled and managed in accordance with the Declaration of Helsinki of 1975 (As revised in Tokyo in 2004). All participants were briefed about the study before collection of their data and informed consent was obtained from them through audio-recorded verbal consent.

Eligibility and recruitment

Patients visiting these clinics were approached and briefed about the study. They were considered eligible to participate in the study if they were registered blind or partially sighted (i.e. vision in the better eye was 20/80 Snellen Visual Acuity, equivalent to 0.6 LogMAR) or worse; as such levels of low vision should, by conventional practice standards, be eligible to take part in vision rehabilitation – including orientation and mobility training. Exclusion criteria consisted of inability to understand or communicate in English, and/or presence of any medical condition that could hinder participation in the study such as speech or cognitive impairment. Between August 3, 2019, and August 23, 2020, a total of 525 patients who were deemed eligible to take part in the study were contacted at the various study sites via telephone calls, emails, and word of mouth. However, only 361 agreed to participate (response success of 68.7%).

Data collection

Participants' answered the survey questions on demographic details such as age, gender, duration of visual impairment, primary diagnosis and cause of visual impairment (if known), the highest level of education, and self-reported health status (with options to subjectively answer whether they felt 'excellent', 'good', 'fair', or 'poor'). Participants were also asked, "Have you ever been informed about or referred for orientation and mobility rehabilitation?". Participants who answered 'Yes' were considered to have awareness of orientation and mobility rehabilitation. The source of the participants' awareness was not limited to the clinical referrals as they were allowed to declare whether they got the awareness from other sources, including family and friends, or through the media.

Participants who answered 'Yes' to the awareness question were subsequently asked whether they had gone for the orientation and mobility training. Furthermore, participants were asked three screening questions recommended for identifying the risk of falls among older adults by primary care: "Have you fallen in the last year?", "Have you sought medical attention for a fall?" and "Do you have a fear of falling?" (Centre for Disease Control and Prevention, 2017; Kristensen et al., 2019). A participant who answered yes to any one of these questions was objectively assessed for risk of falling using the Timed Up and Go (TUG) test - a validated screening tool to help an assessor identify older people at risk of falling (Centre for Disease Control and Prevention, 2017). The test entails asking a person initially seated in a chair, to stand up, and walk at their normal pace to a marked line 3 meter distance from the chair. When the individual gets to the marked line, he/she is requested to turn around, walk back to the chair, and sit down. A person who fails to complete this test within 14 seconds, is considered to be at the risk of falling. The TUG test scores of all participants were recorded (in seconds) as either at risk (over 14 s) or not at risk (14 s or less) (Centre for Disease Prevention and Control, 2017; Kear et al., 2017).

The two primary outcomes for this analysis include: first, awareness of orientation and mobility (O & M) rehabilitation training (yes, no) and, second, among those who indicated that they were aware of O & M rehabilitation training, any previous participation or attendance in O & M rehabilitation (yes, no). Statistical analysis to ascertain the degree of differences in demographic, visual, health, and TUG risk of falls test outcomes were conducted among participants who were aware of O & M services as well as in those who were not. Pearson's $\chi 2$ tests and t-tests were used to investigate for variables that had significant effects. Among those who indicated awareness of O & M rehabilitation training, differences in demographic, visual, health, and risk of falls-related variables were examined in those who had participated in O & M rehabilitation training and in those who never did. Pearson's $\chi 2$ tests and t-tests were repeated and variables that demonstrated statistical significance in t-tests and Pearson's $\chi 2$ tests were included for computation using multiple logistic regression models to determine independent relationships. These computations considered an alpha level of 0.05 as being statistically significant.

Results

Less than half (160 participants (44%) of 361) knew

about Orientation and Mobility Rehabilitation Services (OMRS). Only 26.88% (43 participants) of those who were aware of OMRS, reported accessing the service. Education was the only demographic variable that was related to awareness of OMRS (Table 2). Participants who knew the cause of their sight loss were, on borderline statistical significance, more aware of low-vision services compared with those who did not know the cause of their visual impairment (41% vs 34%, $\chi 2$= 0.381, df=1, p=0.059). Also, those whose visual acuity was 20/400+ or worse were more aware of OMRS compared to other participants with visual acuities between 20/80 and 20/400 (48%, $\chi 2$= 19.264, df= 2, p<0.001). Age, gender, duration of visual impairment, and self-reported health status were not associated with awareness of orientation and mobility rehabilitation services (Table 2). A total of 201 participants completed the TUG test within 14 seconds. Thirty-

Table 2: Relationship between variables and Awareness of O & M Rehabilitation Training

Variable	Not Aware of O&M Rehabilitation *n*= 201	Aware of O&M Rehabilitation *n*= 160	Test statistic $\chi 2$	df	*P* value
Age in years mean (SD) Total (*n*= 361)	71(9)	68(5)	0.774	137	0.146
Gender (%)					
Male (*n*= 159)	64	36	0.452	1	0.182
Female (*n*=202)	70	30			
Highest Level of Education (%)					
Primary or None (*n*= 213)	70	30			
Secondary (*n*= 103)	59	41	18.727	2	< 0.001**
Post-secondary (*n*= 45)	40	60			
Duration of visual Impairment (%)					
0-5 years (*n*= 172)	58	42			
>5-10 years (*n*= 106)	54	46	2.036	2	0.361
10+ years (*n*= 83)	48	52			
Cause of Visual Impairment					
Knew (*n*= 293)	59	41	0.381	1	0.059
Did not Know (*n*= 68)	66	34			
Snellen acuity in better eye (%)					
20/80-20/200 (*n*= 126)	61	39			
20/200^{+}-20/400 (*n*= 139)	59	41	19.264	2	< 0.001**
20/400^{+} or worse (*n*= 96)	52	48			
Self-Reported Health Status					
Excellent (*n*= 58)	56	44			
Good (*n*= 142)	59	41	2.774	3	0.546
Fair (*n*= 100)	62	38			
Poor (*n*= 61)	67	33			
TUG risk of falls test					
At risk (>14s) (*n*= 121)	57	43	10.424	1	0.003**
Not at risk (≤ 14s) (*n*= 201)	63	37			

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nine (39) participants did not take the TUG test for various reasons ranging from not agreeing to participate in that part of the study in order not to risk falling, inability to walk unaided with a walking stick or wheelchair, having a broken leg, arthritis, and having recently gone through a hip, leg, or ankle surgery. Based on the TUG test scores, 121 participants took longer than 14 seconds to complete the test and were identified as being at risk of falling. Participants who were at risk of falls, based on the Timed Up and Go (TUG) test exceeding 14 seconds, were more aware of ORMS (43% vs 37%, $\chi 2$= 10.242, df= 1, p=0.03). To further investigate which variables were independently associated with awareness of OMRS, multiple-logistic regression analysis was conducted by entering statistically significant variables in the preliminary analysis as shown in Table 3.

Participants with post-secondary education (odds ratio [OR] 0.59, 95% Confidence Interval [CI] 0.33 – 0.85) and those with visual acuity worse than 20/400 (odds ratio [OR] 0.56, 95% Confidence Interval [CI] 0.33 – 1.04) were least likely to be unaware of OMRS. Participants who were not at risk of falling were twice likely to be unaware of OMRS as those with risk of falling (odds ratio [OR] 2.11, 95% Confidence Interval [CI] 1.59 – 2.62).
Among participants who were aware of OMRS, only 26% (n=43) participated in OMRS (Table 4).

No demographic variable was found to be associated with participating in OMRS. The duration of visual impairment ($\chi 2$= 6.759, df= 2, p=0.034), awareness of the cause of Low Vision ($\chi 2$= 0.043, df= 1, p=0.043), and being at the risk of falls ($\chi 2$= 9.345, df = 1, p < 0.001), were variables that were significantly associated with taking-up OMRS. Logistic regression model analysing these statistically significant variables showed that participants who had been visually impaired for 5 years or less, were less likely to not participate in O&M training than those with 5-10 years or longer than 10 years duration of visual impairment (odds ratio [OR] 0.70, 95% Confidence Interval [CI] 0.50 - 1.50) (Table 5).

Participants who were visually impaired for longer than 10 years were 3.6 times less likely to participate in O & M rehabilitation (CI: 1.36 - 4.92). Analysis of the impact of visual acuities on the primary outcomes (i.e. awareness of OMRT and participation) showed that study participants with Visual Acuity (VA) less than 20/200 were twice more likely to be aware of OMRT (OR: 0.56, CI: 0.33 – 1.04) and, on borderline statistical significance, more likely to seek OMRT (p = 0.065). Surprisingly, participants who were at the risk of falls were more likely to participate in OMRT than those who were not at the risk of falls (odds ratio [OR] 0.50, 95% Confidence Interval [CI] 1.20 – 1.86). Knowing the cause of visual impairment was

Table 3. Multiple logistic regression model identifying risk factors for lack of awareness of O & M rehabilitation services (*n*= 201)

Risk factor	Odds ratio	95% Confidence interval
Highest Level of Education		
Primary (*n*= 183)	1.00	
Secondary (*n*= 103)	0.80	0.60 – 1.01
Post-secondary (*n*= 45)	0.59	0.33 – 0.85
Snellen acuity in better eye		
20/80-20/200 (*n*= 126)	1.00	
20/200$^+$-20/400 (*n*= 139)	0.75	0.25 – 1.15
20/400$^+$ or worse (*n*= 96)	0.56	0.33 – 1.04
TUG risk of falls test		
At risk (>14s) (*n*= 121)	1.00	
Not at risk (≤ 14s) (*n*= 201)	2.11	1.59 – 2.62

Table 4. Relationship between variables and not going for O & M rehabilitation training

Variable	Did not participate in OMRS (*n*= 117)	Participated in OMR (*n*= 43)	Test-Statistic χ^2	df	*P* value
Age in years mean (SD) Total (n= 160)	69(10)	64(12)	0.892	131	0.211
Gender (%)					
Female (*n*= 57)	67	33	0.462	1	0.561
Male (*n*= 61)	61	39			
Highest Level of Education (%)					
Primary (*n*= 55)	72	28			
Secondary (*n*= 43)	64	36	6.254	2	0.054
Post-secondary (*n*= 27)	55	45			
Duration of visual Impairment (**%)**					
0-5 years (*n*= 72)	58	42			
>5-10 years (*n*= 49)	69	31	6.759	2	0.034**
10+ years (*n*= 43)	75	25			
Cause of Visual Impairment					
Knew (*n*= 120)	64	36	4.221	1	0.043**
Did not Know (*n*= 23)	68	32			
Snellen acuity in better eye (%)					
20/80-20/200 (*n*= 49)	61	39			
20/200$^+$-20/400 (*n*= 57)	60	40	0.197	2	0.065
20/400$^+$ or worse (*n*= 46)	63	37			

Table 5. Multiple logistic regression model identifying risk factors for not going for O & M rehabilitation training (*n*= 160)

Risk factor	Odds ratio	95% Confidence interval
Duration of visual Impairment		
0-5 years (*n*= 72)	0.70	0.5 – 1.50
>5-10 years (*n*= 49)	2.70	1.44 – 3.97
10+ years (*n*= 43)	3.61	1.36 – 4.92
Cause of Visual Impairment		
Knew (*n*= 120)	0.90	0.23-1.40
Did not Know (*n*= 23)	1.25	0.29 – 2. 88
TUG risk of falls test		
At risk (>14s) (*n*= 121)	0.50	0.12-1.86
Not at risk (≤ 14s) (*n*= 201)	1.48	0.15 – 3.98

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no longer statistically significant in this model.

Discussion

This study set out to investigate awareness and uptake of orientation and mobility rehabilitation services (OMRS) among visually impaired individuals in Nigeria. Findings from the study suggest that a significant majority of individuals living with visual impairment, who could potentially benefit from OMRT, lack the awareness of OMRT and only a minority of this population have, at one time or the other accessed it. The findings also suggest that even among those who are aware of the services, participation and uptake remain very low as only about 30% of those who were aware participated in OMRT.

While getting out and about remains a huge challenge for many blind individuals, the problems of lack of awareness and poor access to O&M services compound the challenge. The study findings showed that with increasing duration of visual impairment, awareness seemed to increase (though not statistically significant). This, however, did not seem to correspondingly increase the uptake of OMRT. Perhaps with increasing duration of visual impairment, patients get accustomed to living with the challenges of visual impairment and adapt to coping strategies learned over the years of being blind. It is also possible that, with longer duration, the individual perhaps gets accustomed to living with the challenges associated with the disability, and consequently becomes less enthusiastic about seeking (or participating in) rehabilitation training. There is, however, a scarcity of literature to buttress this conjecture, and further research on how long blind and visually impaired persons live with sight loss before they begin to get indifferent and unenthusiastic about seeking OMRT might be needed. While, to our knowledge, there is no documented evidence that individuals with visual impairment become unconcerned or unenthusiastic about vision rehabilitation at any time, this study's findings presume that prolonged conditions of visual impairment left unattended may result in apathy especially when the individual believes that they have successfully self-adjusted to the challenges of living with low vision.

Nevertheless, this finding underscores the importance of early referral for rehabilitation training. On the other hand, participants with a shorter duration of visual impairment (diagnosed within five years) were more likely to seek OMRT than those who had been diagnosed for longer than 5 years. A possible explanation for the tendency to seek rehabilitation training at the early stages of vision disability trajectory is that the challenges of coping with sight loss often, arguably, appear more bizarre and untypical for the individual during the first few years (Stevelink & Fear, 2016) of the impairment, and could, perhaps, compel the affected individual to seek help or training enabling the development of adaptive skills (Bergeron & Wanet-Defalque, 2013).

There is a great deal of associational evidence that education plays a central role in the mediation and determination of health inequalities (Arcaya et al., 2015; Bado & Susuman, 2016). Findings from this study resonate with some previous studies demonstrating that such relationship might not be entirely linear but potentially dependent on other factors such as access to psychosocial resources (Ross & Mirowsky, 1999; Conti et al., 2010), and lifestyle or health-related behaviors (Liu et al., 2015; Zimmerman et al.,2015). Having a post-secondary education was unsurprisingly associated with awareness of OMRT, but was not associated with participating in the training. Further studies are needed to understand critical factors negatively affecting decisions to participate in mobility rehabilitation especially when the individual is aware of the potential benefits, and how this varies across the lifespan.

Findings also showed that being at the risk of falls was the only variable that was associated with the two major outcomes of focus in this study (i.e. awareness of OMRT and participation in OMRT). While previous studies have successfully demonstrated that visual impairment acts as an independent risk factor for falls (Lamoureux et al., 2010; Adams et al., 2018), not much research has identified being at the risk of falls as a major

independent predictor for blind and visually impaired people's uptake of any relevant rehabilitation training. It is, thus, important that evaluating the risks of falls among visually impaired persons be taken as a pivotal assessment that could potentially suggest the need for a referral of a visually impaired person to an O&M specialist.

Limitations of study

These findings should, nevertheless, be interpreted with caution due to the small sample size and also because some participants could not take the TUG test. Larger sample size is needed to confirm these findings. The study did not investigate the reasons why participants who were aware of OMRT failed to participate, as it was not the focus of the study. This is, however, planned (in continuation) as a future study by the authors. This study did not also investigate the scope of OMRT that was accessed by those who participated. It is important to note that the study sample might not be a true representative sample of the visually impaired population in Nigeria as a convenience sampling technique was employed, and as such, generalizations cannot be made from the study conclusions.

Conclusion

Awareness of and participation in orientation and mobility training among blind and visually impaired persons in Nigeria is low. Promoting awareness and encouraging uptake is critical for people living with sight loss. Referring visually impaired persons who could potentially benefit from orientation and mobility training to rehabilitation specialists, in the early years following the diagnosis could encourage uptake of the training. Reports of falls and fear of falls could be regarded as an important pointer to the need for OMRT. Where such fears of falling exist, it might be worth conducting a fear of falls test and considering prompt referral for OMRT.

Conflict of Interest: The authors have no conflict of interest to declare on the publication of this manuscript. The study received support for critical commentary from research faculty (Professor James Leja and Professor Elyse Connors – both at the Department of Blindness and Low Vision Studies, Western Michigan University, USA).

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