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# Knowledge and Practice of Needle Stick and Sharp Injuries Prevention Among Health Care Workers in a Tertiary Hospital in Enugu State Nigeria

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### Abstract

Occupational health hazard still remains a burden resulting in such conditions as pneumoconiosis, silicosis and blood-borne infections of which human immunodeficiency infection is inclusive. Needle sticks and other sharps-related injuries which expose workers to blood borne pathogens continue to be a significant hazard for hospital employees. This study examined knowledge and practice of Needle stick and sharp injuries prevention among health care workers. This is to determine the factors that affect the preventive practices of health care workers regarding needle stick and sharps injuries. The study design was a descriptive cross-sectional study design and 272 health care workers (133 males and 139 females) took part in the study. The knowledge of Needle stick and sharp injuries scale developed by the researcher was used to elicit responses from the participants. Descriptive statistics and logistic regression were used to analyze the demographic variables and the data obtained from the participants. The study population was recruited from a selected tertiary hospital in Enugu state using stratified sampling method and the study was conducted in the year 2015. The result of the study showed that age, years of practice and experience of Needle stick and sharps injuries significantly affected the preventive practices against injuries among health care workers. The ages of the participants range from 21-58 years with the mean and standard deviation as 37.7 and 8.0 respectively. These findings from this study imply that younger health care workers are more likely to have needle stick and sharp injuries than the older ones. Also, people who have spent more years in practice are likely to record more injuries. Finally, the study result implies that people who have had Needle sticks and sharps injuries are more likely to take precautions and measures to avoid its occurrence in the future. Employers of health care workers should ensure that the younger staff are properly trained in the safe use and disposal of needles, the training should be on-going at short intervals to make up for the greater years of practice their older counterparts have over them; they should also modify work practices that can result in injuries; safety awareness should be promoted in the work environment and most importantly, procedures for reporting and timely follow up of all Needlestick and sharp related injuries should be established and encouraged.

## 1. Introduction

Accidental needle stick and sharp object injuries carry major risk factors for blood-borne infections amongst health workers. The risk associated with Needle Stick Injuries varies depending on the devices, sharps waste management practices, degree of experience of health care workers, training opportunities, and the level of universal precaution practices [1, 2] Research findings on needle stick injury indicated that it ranged from 21% to 95% exposing healthcare workers to over 20 different blood borne pathogens, and resulting in 1000 infections per year [3, 4] The incidence of all injuries with potential to transmit these infections varies between occupational groups but is more prevalent in those providing primary care and performing invasive procedures [5] The blood-borne infections that are mostly contracted through occupational hazards are Hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). These blood borne infections have serious consequences, including long-term illness, disability and death and are a matter of concern for many African as well as Asian countries [6] While the risk of HIV infection is very low, the risk of infection with hepatitis, especially hepatitis B among unimmunized workers is very high. According to the WHO, in some areas of the world, over 80% of health care workers have not been immunized against hepatitis B despite its 95% efficacy rate [7]. Studies done before the availability of hepatitis B vaccine showed rates of HBV transmission ranging from 6% to 30% after a single needle stick exposure to an HBV-infected patient [8]. However, epidemiologic studies of health care workers exposed to HCV through a needle stick or other percutaneous injury have found that the incidence of infection averages 1.8% per injury. Of the total new HCV infections that have occurred annually (declining from 112,000 in 1991 to 38,000 in 1997), 2% to 4% have been in health care workers exposed to blood in the workplace. Post exposure prophylaxis is available for hepatitis B and HIV exposures but not for hepatitis C. However, preventing the needle stick injury in the first place is the best approach to preventing these diseases in health care workers, and it is an important part of any blood borne pathogen prevention program in the workplace [8]

The risk of transmission of these diseases following percutaneous exposure among healthcare workers is high. Therefore, there is need for health workers to adhere to universal safety precautions in order to avoid injury from needles and other sharp instruments that have been exposed to body fluids or blood products. It is estimated that about two million needle stick injuries occur annually among health workers resulting in HBV, HCV, and HIV infections. The incidence of needle stick and sharp object injuries varies among health workers globally, though it is believed to be under reported [9]. Unreported needle stick and sharps injuries are a serious problem and prevent injured health care workers from receiving post-HIV exposure prophylaxis

shown to be 80% effective against HIV infection. According to researchers, 40-70% of all needle stick injuries are unreported, thus the statistics are only estimates [10, 11] in the United States of America, an extensive survey documented an underreporting of medical sharps injuries at 58%, while other studies estimate underreporting at 90% [12]. In most developing countries, there is a paucity of standard reporting protocols apart from the fact that most exposures among health workers are caused by medical sharps [13]. This high number of infections can be disheartening; it becomes even frightening knowing that these infections can easily be contracted and also spread from injuries that are sustained from needle stick and sharps during the delivery of health care services [14].

The World Health Organization (WHO) estimates that 3 million percutaneous exposures occur annually among 35 million Health-care workers (HCW) globally; over 90% occurring in resource constrained countries. In Uganda, a cross-sectional study found an annual incidence rate of 3.94 needle stick and medical sharps injuries per healthcare worker [15]. Similarly, according to a Tanzania study, five hundred thousand health care workers per year experienced percutaneous injuries [16]. Momah in a study of the epidemiology of needle stick and sharps injuries among healthcare workers in Nigerian hospitals found that 84.2% of the respondents had experienced at least one injury since embarking on their respective careers while 62.2% of them sustained their recent injury within the past one year [17]. Health-care workers in Africa suffer two to four needle-stick injuries per year on the average, with Nigeria, Tanzania and South Africa reporting 2.10 injuries per HCW on average. Each year as a consequence of occupational exposure, an estimated 66,000 Hepatitis B, 16,000 Hepatitis C and up-to 1,000 HIV infections occur among HCWs. These infections are preventable through infection control measures which significantly reduce the risk of HIV and Hepatitis transmission among health workers [18]. Strategies are available to prevent infections due to sharps injuries. These include education of health care workers on the risks and precautions, reduction of invasive procedures, use of safer devices and procedures and management of exposures [19]. In the industrialized world, occupational surveillance assess and monitor the health hazards related to blood borne pathogens and prevention measures to reduce the risk of transmission. In contrast, in developing countries, exposure and health impacts are rarely monitored and much remains to be done to protect health care workers from such risks that cause infections, illness, disability and deaths that may in turn impact on the quality of health care [7].

## 2. Materials and Methods

### 2.1. Study Area

The study was carried out at Enugu State Teaching Hospital located in the south-east geopolitical zone of

Nigeria. The teaching hospital serves the tertiary needs of people in Enugu State.

## 2.2. Study Design

The study was a descriptive cross-sectional study to assess the 'Knowledge and practice of needle sticks and sharps injuries prevention among health care workers in the Enugu State University Teaching Hospital (ESUTH).' In this study, doctors, nurses and laboratory scientist were interviewed using structured questionnaires in line with the objectives of this study.

## 2.3. Study Population

This comprised HCWs (doctors, nurses and laboratory scientists) working in a selected tertiary hospital in Enugu State.

## 2.4. Sample Size Determination

Based on a study carried out on Needle stick injuries among medical interns at the University of Nigeria Teaching hospital, Enugu, Nigeria, the prevalence rate was found to be at 80.3%. The formula to calculate the sample size of one group was used to determine the sample size of the study [20].

$$N = \frac{Z\alpha^2 \times P(1 - P)}{D^2}$$

Where

$Z\alpha$  = significant level usually set at 95% confidence level,  $Z\alpha$  is 1.96 (two sided)

$P$  = Prevalence of the attribute under study =80.3% (0.803).

$D$  = Margin of error tolerated (usually set at 0.05

Therefore,  $N = \frac{1.96^2 \times 0.803(1-0.803)}{0.05^2}$

$$N = \frac{3.8416 \times 0.803(0.197)}{0.05^2}$$

$$N = \frac{3.8416 \times 0.803 \times 0.197}{0.0025}$$

$$N = \frac{0.6077065}{0.0025}$$

$$N = 243.08 \approx 244$$

To allow for the anticipated non responses, 10% of the sample was also added.

Thus,

$$\frac{10 \times 244}{100} = 24.4$$

Therefore, the sample size = 24.4 + 244 =268.4

Hence the sample size is 280.

## 2.5. Sampling Technique

The total staff strength of laboratory scientists (67),

doctors (167), and nurses (262) was used as the sample frame (496). The study involved the use of proportionate stratified sampling. The health care workers were first of all stratified into lab scientists, doctors and nurses. Then the study sample in each stratum was selected in the ratio of 1:3:4 respectively. Such that,

Lab. Scientists =  $1/8 \times 280 = 35$ ; Doctors =  $3/8 \times 280 = 105$ ; and Nurses =  $4/8 \times 280 = 140$ .

## 2.6. Study Instruments

Structured, interviewer administered questionnaire was used to obtain data on variables in the study including socio-demographic variables, knowledge, prevalence and practice of preventive strategies to reduce Needle stick and sharps injuries. The questionnaire was validated by pretesting it in another tertiary hospital in a state not to be used in the main study.

## 2.7. Data Collection Methods

Pretesting of the questionnaires: the questionnaires were tested for construct validity in a tertiary hospital far apart from the selected tertiary hospital for study. Corrections, omissions and additions were made in the questionnaire, before the data collection proper started. The data collection was for five (5) weeks.

## 2.8. Data Management

### 2.8.1. Measurement of Variables

Variables analyzed: socio-demographic variables including age, sex, job type, years of practice, qualification, knowledge, prevalence and practices that reduce Needle stick and sharps injuries among HCWs as well as socio-demographic factors influencing practices that reduce Needle stick and sharps injuries.

### 2.8.2. Statistical Analyses

Data was collated and analyzed using Statistical Packages for Social Sciences (SPSS) version 20. Frequency and percentage tables were drawn to show the distribution of data for both demographic variables and research questions. Mean and standard Deviation as summary measures were used for quantitative variables like age at last birthday and number of years of practice. Logistic regression was done for test of hypothesis and P value less than 0.05 is considered significant.

## 2.9. Ethical Approval

Approval for this research was granted by the Research Ethics Committee of the Enugu State Ministry of Health, Enugu. Individual informed consent was also obtained from all participants following a verbal and written explanation of study aims and procedures.

## 3. Results

Two hundred and eighty (280) copies of questionnaire

were administered out of which two hundred and seventy-two (272) of them were returned and found usable for statistical analysis; representing 97.1% of the total questionnaires. To realize the objectives set for this study, the data were analyzed item by item using descriptive statistics.

**Demographic Characteristics of Respondents**

Descriptive statistics involving frequencies and their percentages were used to analyze data on demographic profiles of the respondents. The age range of the respondents is 21-58years with mean and standard deviation of 37.7±8.0years, while their year of experience as a health worker ranged from 1-34years with mean and standard deviation of 9.2±6.2years. The results of the analysis were presented in Table 1 below.

**Table 1. Demographic Distribution of the Respondents.**

N = 272

Demographic Characteristics	No of Respondents	Percentage
Age Group		
21 – 30years	57	21.0%
31 – 40years	127	46.7%
41 – 50years	69	25.4%
51 – 60years	19	7.0%
Sex		
Male	133	48.9%
Female	139	51.1%
Job Type		
Doctor	96	35.3%
Nurse	139	51.1%
Lab Scientist	37	13.6%
Years of Experience		
1 – 5years	85	31.3%
6 – 10years	109	40.1%

**Table 2. Respondents' Knowledge of Needle Sticks and Sharp Injuries.**

N = 272

Knowledge of Needle Sticks and Sharps Injuries	No of Respondents	Percentage
What universal safety precautions do you know on needle stick and sharps?		
Wearing of gloves	131	48.2%
Washing of the affected area	131	48.2%
Post exposure prophylaxis	161	59.2%
Safe disposal of sharp instruments	230	84.6%
Have you any knowledge of universal safety precautions on needle stick and sharps		
Yes	269	98.9%
No	3	1.1%
Are you aware of the risk associated with needle stick and sharp injuries?		
Yes	261	96.0%
No	11	4.0%
Have you had any training on prevention of needle stick and sharp inquiries?		
Yes	217	79.8%
No	55	20.2%
Do you know of any safety device(s) that reduce(s) the risk of getting needle stick and sharps injuries?		
Needle holders	176	64.7%
Tissue forceps	114	41.9%
Gloves	120	44.1%
Plastic containers	137	50.4%
Retractors	133	48.9%
Others e.g. safety boxes	1	0.4%
One of these diseases can be gotten from needle stick and sharps injuries		
Jaundice	1	0.4%
HIV	270	99.3%
Others e.g. Tetanus	1	0.4%

Demographic Characteristics	No of Respondents	Percentage
11 – 15years	46	16.9%
16 – 20years	14	5.1%
21years & above	18	6.6%
Qualification		
Diploma	81	50.0%
BNSc	69	42.6%
Master Degree	4	2.5%
Others (RN, SNM)	8	4.9%

Table 2 shows the knowledge of needle sticks and sharps injuries among the respondents. The commonest universal safety precautions the respondents know on needle stick and sharps when multiple choices were allowed was safe disposal of sharp instruments 230 (84.6%). From this, it could be deduced that 269 (98.9%) of the respondents knew one or more of universal safety precautions on needle stick and sharps, while only 3 (1.1%) of them did not know any universal safety precautions on needle stick and sharps. Also, 261 (96.0%) of the respondents were aware of the risk associated with needle stick and sharp injuries, while only 11 (4.0%) of them were not aware of the risk associated with needle stick and sharp injuries. On the knowledge of safety device(s) that reduce(s) the risk of getting needle stick and sharps injuries when multiple choices were allowed, majority of the respondents 176 (64.7%) knew of needle holders, while tissue forceps was the least known 114 (41.9%). Also on the knowledge of the disease that could be gotten from needle stick and sharps injuries, almost all the respondents 270 (99.3%) knew of HIV, while one respondent each (0.4%) knew of jaundice and tetanus.

Table 3 showed the prevalence of needle sticks and sharp injuries among the respondents. From the result, 183 (67.3%) of the respondents had experienced a needle stick and sharp injury before, while 89 (32.7%) of them had not experienced a needle stick and sharp injury before. From among the 183 respondents that had experienced a needle stick and sharp injury before, majority of them 92 (50.3%) got the needle stick and sharp injury when recapping a needle, while only 11 (6.0%) of them got the needle stick and sharp injury when washing/sterilizing instruments. Also on the last time the respondents experienced a needle stick and sharp injury, majority of them 124 (67.8%) experienced it in 1-5years ago, while only 4 (2.2%) of them experienced it in 11-15years ago. More so, from the 183 respondents that had experienced a needle stick and sharp injury before, majority of them 140

(76.5%) sustained needle stick, while majority of them 148 (80.9%) had not experienced a needle stick and sharp injury within the last 12months. Only 30 (16.4%) and 5 (2.7%) from among the 183 respondents that had experienced a needle stick and sharp injury before had it once and twice respectively in the last 12months. Using the formular:

$$\text{Prevalence rate} = \frac{\text{number of existing cases of a disease during a period}}{\text{Total population}} \times K$$

Total population

Where, number of existing cases = 183

Total population = 280

K = 100

Prevalence rate =  $183/280 \times 100 = 65.4\%$

**Table 3.** Prevalence of Needle Sticks and Sharp Injuries Among the Respondents.

Prevalence of Needle Sticks and Sharps Injuries	No of Respondents	Percentage
Have you experience a needle stick and sharp injury before?		
Yes	183	67.3%
No	89	32.7%
Total	272	100%
If yes, what was the occasion when it occurred?		
When drawing blood	15	8.2%
When injecting a patient	26	14.2%
When recapping a needle	92	50.3%
When washing/sterilizing instruments	11	6.0%
When disposing contaminated instruments	13	7.1%
Others e.g. while setting a line, suturing, dressing, stitching	26	14.2%
Total	183	100%
When was the last time of injury occurrence?		
Less than a year	11	6.0%
1-5years	124	67.8%
6-10years	44	24.0%
11-15years	4	2.2%
Total	183	100%
Which type of injury have you sustained?		
Glass ware	14	7.7%
Sharps/ scalpel	27	14.8%
Needle stick	140	76.5%
Others	2	1.1%
Total	183	100%
How many times have you experienced a needle stick and sharp injury within the last 12months?		
None	148	80.9%
Once	30	16.4%
Twice	5	2.7%
Total	183	100%

Among all the respondents, 114 (41.9%) of them knew of any colleague that has experienced a needle stick and sharp injury within the last 12months, while 158 (58.1%) of them did not know any colleague that has experienced a needle stick and sharp injury within the last 12months.

**Table 4.** Practices that reduce needle sticks and sharp injuries among the respondents.

Practices that Reduce Needle Sticks and Sharps Injuries	No of Respondents	Percentage
How would you grade your use of safety devices to help to reduce the risk of getting needle stick and sharp injuries?		
Poor	24	8.8%
Fair	127	46.7%
Good	121	44.5%
Total	272	100%
How would you grade the specific methods you use for preventing needle stick and sharp injuries?		
Poor	11	4.0%
Fair	131	48.2%

Practices that Reduce Needle Sticks and Sharps Injuries	No of Respondents	Percentage
Good	130	47.8%
Total	272	100%
Do you discard contaminated needles immediately into safety/ sharps containers?		
Yes	264	97.1%
No	8	2.9%
Total	272	100%
If yes, is it?		
Always	156	59.1%
Sometimes	102	38.6%
Rarely	6	2.3%
Total	264	100%
Are sharps containers placed at eye level and at arms' reach?		
Yes	104	38.2%
No	168	61.8%
Total	272	100%
Have you been immunized against Hepatitis B?		
Yes	126	46.3%
No	146	53.7%
Total	272	100%
How many needle stick and sharp injuries have you had after the training on its prevention?		
No training	55	20.2%
None	196	72.1%
One	16	5.9%
Two	5	1.8%
Total	272	100%

Table 5 shows the factors that affect practices of the respondents regarding Needle-stick and Sharps Injuries. The result of this table shows that knowledge of needle sticks and sharps injuries had a significant effect on preventive practices among the respondents. These effects are demonstrated in three dimensions: Age had a statistically significant effect on preventive practices  $B(0.917,1)= 2.477, P<.005$ ; Years of practice had a significant effect on preventive practices  $B(0.838,1)= 2.313, P<.05$ , and Experience on needle stick

and sharps had a significant effect on preventive practices  $B(1.484,1)=4.441, P<0.05$ . The table also showed that there were no significant effect of sex, job type, awareness of the risks associated with needle sticks and sharps injuries, training on preventive practices. Thus, from the results of the hypothesis testing, the significant factors that affect the practices of HCWs regarding Needle stick and Sharps Injuries were age, years of practice, and experience on needle stick & sharps injuries ( $P<0.05$ ).

Table 5. Factors that affect practices of the respondents regarding needle-stick and sharps injuries.

Factors	B	df	P-value	Odd Ratio
Age	0.907	1	0.040*	2.477
Sex	-0.728	1	0.240	0.483
Job type	0.096	1	0.777	1.101
Years of practice	0.838	1	0.042*	2.313
Awareness of the risk associated with needle stick & sharps injuries	-1.228	1	0.314	0.293
Training on prevention of needle stick & sharp injuries	-0.096	1	0.884	0.908
Experience on needle stick & sharp injuries	1.484	1	0.034*	4.411
Constant	0.375	1	0.849	1.455

Note: \*  $P<0.05$  (Significant)

#### 4. Discussion

In this study, it was revealed that the health care workers (HCWs) have poor knowledge of Needle stick and sharps injury prevention. With the commonest universal safety precautions among them as safe disposal of sharp instruments (84.6%), it is perceived as limited knowledge. This is similar to the finding of a study in Nigeria on universal precautions [21]. It was also observed that 98.9% of the respondents knew one or more universal safety precautions on needle stick and sharps injuries (NSSIs) which is in agreement with the findings of some studies in India, Edo and Lagos states, Nigeria on standard precautions and post exposure

prophylaxis for preventing infection [22].

The HCWs simply get to know or hear about them but do not get to use or apply them in most cases. However, the level of awareness regarding the risk associated with Needle stick and sharp injuries was high among the respondents (96.0%) and the commonly known disease/infection among them transmissible through percutaneous exposures is the human immunodeficiency virus (HIV) (99.3%). These findings were also observed in some reports of the literature. [9, 18, 22, 24]. These findings may be attributed to factors such as the fact that this is an era of HIV epidemic in sub-Saharan Africa and developing countries account for the highest prevalence of HIV-infected patients as well as record the highest Needle stick injuries [25-26]. There is need to

protect health care workers from these hazards that can lead to illness, disability and death so that the quality of health care in Nigeria will not be affected. Exposure and health impacts should be monitored by way of occupational surveillance system that will assess and monitor the health hazards related to blood borne pathogens and prevention measures to reduce the risk of transmission.

Majority of the respondents reported to know needle holder and tissue forceps as safety devices for reducing the hazard of sharps—a clear indication of poor engineering and work practice controls in Nigerian health institutions. There is need to adopt such measures as self-sheathing needles, needleless systems among others to limit exposures. Prevalence of Needle stick and sharps injuries was high among respondents as was the finding of two (2) injuries per HCW per year in previous studies on Nigeria, Tanzania and South Africa [18, 19]. Also supporting this finding are the findings of 64.4%; 81.7% and 80% incidence rates in studies conducted in Enugu and Anambra States of Nigeria on Needle stick injuries among medical interns [27]; Prevalence of and attitude towards needle stick injuries among medical practitioners [28] and Blood and Body Fluid Exposures to Skin and Mucous Membranes [29]. This implies that a large number of Nigerian health care workers have experienced needle stick and sharps injuries.

Majority of these percutaneous injuries occurred during recapping of used needles, conforming to the findings of 10% to 25% Needle stick. Stick Injury occurrence during needle recapping [29-33]. Another reflection of poor engineering and work practice controls in the health institutions.. Recapping of needles should be prohibited. Circumstances that can lead to injuries while delivering health services should be altered and constant supply of disposable syringes and safer needle devices should be ensured.

A lot of cases, according to the result of this study went unreported (61.4%); probably owing to poor or no reporting systems available in the facilities thereby affecting the availability of actual figures as it concerns the incidence rates of needle stick and sharps injuries [34]. This was the case in previous findings such that 90% of the occupational exposures occurs in the developing world but 90% of the reports of occupational infections occurs in the United States and Europe [35]; 70% of the world's HIV case is in sub-Saharan Africa but only 4% of its worldwide occupational cases is reported from this region [36]; research has shown 40-75% under reporting of these injuries [37]; 65% of the respondents involving doctors, nurses and phlebotomist in a study reported no occupational exposures from needle stick and sharps injuries [38]; and 80% of 300 health care professionals knew that they should report Needle stick and Sharps Injuries but only 51% of the affected ones actually reported [39].

It is an unhealthy situation that 40% of the reported cases did not receive post exposure prophylaxis. This is reflecting the poor follow-up procedures in the health facilities which is a good reason among others for under reporting as asserted in the literature [40]. This implies improper documentation of

needle sticks and sharps injuries. There is need for surveillance and functional reporting systems in health facilities and further need for the education of health care workers on the reporting systems available to them.

Considering the finding that 53.7% of the respondents had not been immunized against HBV even when they are aware of the risk associated with Needle stick and sharps injuries, it can be deduced that HCWs do not have the right attitude as it pertains to universal precautions. This is a clear case of poor compliance with universal precautions among health care workers in Nigerian health institutions [41]. The knowledge of the risk of exposure to Needle stick and sharps injuries and the preventive strategies used against them will help health care workers in improving their attitude towards better practices that would reduce the incidence rates of percutaneous injuries/exposure among health care workers [19]. There is need to provide health education on universal precautions for all health workers on regular basis so that they can always adhere to it.

The finding that experiences on needle stick and sharps injuries significantly affects practice is indicative of the fact that repeated episodes of the injuries has taught the victims how to cautiously perform their tasks. From this point of view, policy makers should adopt training sessions for HCWs at short intervals to improve their knowledge and skill levels regarding health service delivery.

## 5. Conclusion and Recommendation

The knowledge of needlestick and sharps injuries prevention is relatively poor in Nigerian health institutions. Preventive practices, effective engineering and work practice controls are equally poor. Consequently, the prevalence rate of needlestick and sharps injuries is high among health care workers.

The study therefore recommends that all the available preventive strategies should be adopted with equal attention so as to strike a balance in their areas of effect; health institutions should be supplied with devices that have safe features to phase out the unsafe ones; puncture and liquid proof safety containers should be provided and placed at every patient care area for easy access; health care workers should be subjected to on – the –job training at intervals to keep upgrading their level of knowledge.

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