

## Original Article

# Use of the World Health Organization Surgical Safety Checklist by Nigerian Anesthetists

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### ABSTRACT

**Background:** Surgery and anesthesia are essential parts of global healthcare. Surgical intervention has been largely beneficial but remains associated with significant morbidity and mortality. The increasing complexity of surgical interventions has made providers more prone to avoidable errors. The World Health Organization Surgical Safety Checklist (WHO SSC) was disseminated worldwide with the aim of reducing perioperative morbidity and mortality. **Objective:** There is a paucity of data to assess awareness and use of WHO SSC in low- and middle-income countries. The aim of this study is to evaluate the knowledge and use of WHO SSC by Nigerian anesthetists. **Methodology:** A structured self-reporting questionnaire was distributed to Nigerian physician anesthetists. One hundred and twenty-two questionnaires were distributed with 102 completed reflecting a response rate of 83.6%. **Results:** Awareness of the WHO SSC was reported by 93.1% of the respondents. Routine use of the checklist was reported by 62.7% of the respondents mostly in the teaching hospitals compared with the general hospitals and comprehensive health centers (86.2%, 23.3% and 14.3%,  $P = 0.0001$ ). The respondents who had a perception that WHO SSC does not prevent errors were the least likely to use it (odds ratio: 0.08,  $P = 0.0117$ ). **Conclusion:** This study identified a high level of awareness and use of the WHO SSC by physician anesthetists in Nigeria. However, its use is mostly use of The WHO SSC list by Nigerian anesthetists in teaching hospitals.

**KEYWORDS:** Acceptance, anesthetist, checklist, safety, surgical

## INTRODUCTION

Surgery and anesthesia are essential parts of global healthcare with an estimated 312 million surgical procedures performed annually.<sup>[1]</sup>

The World Health Organization Surgical Safety Checklist (WHO SSC) was disseminated worldwide with the aim of reducing perioperative morbidity and mortality. The increasing complexity of surgical interventions has made providers more prone to avoidable errors.<sup>[2-7]</sup>

There are few data on the use of WHO SSC in low- and middle-income countries such as Nigeria. This study aims to evaluate the use of WHO SSC by Nigerian anesthetists.

## METHODOLOGY

This was a descriptive cross-sectional survey carried out among a purposive sample of certified

physician anesthetists who attended the 23<sup>rd</sup> Scientific Conference and Annual General Meeting of the Nigerian Society of Anaesthetists held in Owerri, Imo State, Nigeria, from 16 to 20 November 2016. Nonphysician anesthetists and physician anesthetists practising outside Nigeria were excluded from the study. The questionnaire items had been pretested among senior registrar grade anesthetists and modified for clarity. The main outcome of interest for the study is defined by the dichotomous response item assessing “routine use of WHO SSC (yes/no).” The questionnaire response items included institutional type, designation, years of post qualification

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experience and perception about the WHO SSC. Other survey response items collected included practice information about who administers the WHO SSC, actions pertaining to implementation and frequency of use. Other items can be found in the supplementary table for the questionnaire. Univariate analysis was used to determine the frequencies and properties of the characteristics of the respondents level of

awareness and bivariate analysis used to determine the association between the WHO SSC and independent variables (institutional type, professional status and years of experience). Multivariate logistic regression analysis was used to determine the adjusted odd ratios for predictors of routine use of the WHO SSC using a forward stepwise variable selection procedure. To account for small sample sizes, two-sided Fisher's exact test was used to assess differences during bivariate analysis. Bivariate results and previous literature findings were used in selecting variables of interest for model building during multiple logistic regression analyses. Model fit statistics used during model development included the Akaike Information Criterion and log-likelihoods (-2 Log L). The models selected made the most sense and had the best goodness of fit. To optimize binary logit models and ensure convergence, "Firth's bias correction" was applied as a restrictive penalty to the multiple logistic regression. Statistically significant level was set at a  $P < 0.05$ , and Wald Chi-square statistics are reported to denote statistical significance. All data were

**Table 1: Demographic factors**

Factors	Frequency, n (%)	Routinely use WHO SSC (%)	P
Age			
24-34	16 (15.7)	68.1	0.2706
35-44	47 (46.1)	71.0	
45-54	31 (30.4)	37.5	
55+	8 (7.8)	50.0	
Gender			
Male	64 (62.7)	70.3	0.0564
Female	38 (37.3)	50.0	
Designation			
Registrar	43 (42.1)	60.5	0.5002
Consultant	42 (41.2)	69.1	
Senior registrar	17 (16.7)	52.9	
Institution type			
Teaching hospital	65 (63.7)	86.2	0.0001
General hospital	30 (29.4)	23.3	
Comprehensive health centre	7 (6.9)	14.3	

WHO: World Health Organization, SSC: Surgical Safety Checklist

**Table 2: Awareness of the World Health Organization Surgical Safety Checklist by physician anesthetists**

Factors	Frequency, n (%)
Awareness	95 (93.1)
Institution	7 (6.9)
Teaching hospital	
Yes	65 (100.0)
No	0
General hospital	
Yes	28 (93.3)
No	2 (6.7)
Comprehensive health center	
Yes	2 (0.0)
No	5 (100.0)
Professional status	
Consultant	
Yes	42 (100.0)
No	0
Senior registrar	
Yes	17 (100.0)
No	0
Registrar/medical officer	
Yes	36 (83.7)
No	7 (16.3)

**Table 3: Knowledge, attitudes, and practice of World Health Organization Surgical Safety Checklist**

	Frequency, n (%)	Routinely use WHO SSC (%)	P
Routinely, WHO SSC should be applied			
Yes	64 (62.7)	Reference	
No	38 (37.3)	Reference	
Prior to induction			
Yes	95 (93.1)	63.5	0.6683
No	7 (6.9)	50.0	
Prior to skin incision			
Yes	89 (87.3)	74.5	0.0237
No	13 (12.7)	51.0	
Prior to patient's exit from operating room			
Yes	51 (50.0)	60.7	0.3617
No	51 (50.0)	76.9	
WHO SSC is administered by who in your organization			
Nurse	67 (65.7)	60.6	0.2006
Anesthetist/surgeon	35 (34.3)	57.1	
Does the WHO SSC promote communication?			
Yes	92 (90.2)	66.3	0.0369
No	10 (9.8)	30.0	
Does the WHO SSC prevent errors			
Yes	93 (91.2)	66.7	0.0125
No	9 (8.8)	22.2	

WHO: World Health Organization, SSC: Surgical Safety Checklist

**Table 4: Multiple regression results of survey analyses of factors associated with respondents' attitudes about routinely using the World Health Organization Surgical Safety Checklist<sup>a</sup>**

Factors	OR <sup>b</sup>	P <sup>c</sup>	OR <sup>d</sup>	P <sup>c</sup>
Age				0.4765
24-34	0.74	0.4678	1.00	0.4835
35-44	2.77	0.1573	3.40	0.1432
45-54	1.50	0.8055	2.22	0.5947
55+	Reference		Reference	
Gender				
Male	Reference		Reference	0.1884
Female	0.36	0.0934	0.47	0.1884
Professional status				0.9966
Registrar	1.17	0.7830	1.06	0.9372
Consultant	0.94	0.8583	1.08	0.9822
Senior registrar	Reference		Reference	
Institution type				0.0001
Comprehensive health centre	0.04	0.665	0.03	0.0438
General hospital	0.08	0.2354	0.08	0.2337
Teaching hospital	Reference		Reference	
WHO SSC is administered by who in your organization				0.7387
Nurse	Reference		Reference	
Anesthetist/surgeon	1.70	0.4322	1.22	0.7387
Does the WHO SSC prevent errors at your organization?				
Yes	Reference		Reference	0.0117
No	0.09	0.3526	0.08	0.0117
Routinely, WHO SSC should be applied: Before patient's exit from operating room				
Yes	Reference		Reference	0.7604
No	0.76	0.6811	0.83	0.7604

<sup>a</sup>Multiple regression results for unadjusted and final model. Best model was one with smallest AIC, SC,  $-2 \log L$  and "c" statistic of 0.906,

<sup>b</sup>Unadjusted odds ratios, <sup>c</sup>P-values for Wald Chi-square statistic, <sup>d</sup>Final model adjusted OR. WHO: World Health Organization, SSC: Surgical Safety Checklist, OR: Odds ratio, AIC: Akaike information criterion

analyzed using Statistical Analysis System statistical software 9.4 Cary, North Carolina, USA.

## RESULTS

One hundred and twenty-two questionnaires were distributed with 102 completed. The response rate was 83.6%. The mean ( $\pm$  standard deviation) age of respondents was  $42 \pm 7.78$  years. Majority of the survey respondents were male (62.7%), consultant grade level (42.2%), and worked in teaching hospitals (63.7%) [Table 1]. A total of 95 (93.1%) respondents were aware of the WHO SSC. The level of awareness in teaching hospitals, general hospitals, and comprehensive health centers was 100%, 93.3%, and 0%, respectively [Table 2]. Overall, 93.1% of respondents were convinced that the WHO SSC was useful, while 62.7% reported routinely using the WHO SSC. The WHO SSC was applied before induction by 93.1% of respondents, before skin incision by 87.3%, and before leaving the operating room by 50.0% of respondents [Table 3]. Majority of the respondents indicated that the checklist was

administered by nurses (65.7%) in the operating room. Only 9.8% of respondents reported the WHO SSC as "not at all easy" to use, while 6.9% found it slightly easy and 23.5% found it moderately easy. Majority of respondents reported it as "very easy" (41.2%) or "extremely easy" (18.6%) to use. Most respondents acknowledged that WHO SSC improved communications (90.2%) and prevented errors (91.2%) [Table 3].

Significant differences were observed for institutional use of WHO SSC with routine use occurring more frequently in teaching hospitals than in general hospitals or comprehensive health centers, respectively (86.2% vs. 23.3% and 14.3%;  $P = 0.0001$ ). A larger proportion of respondents who used WHO SSC routinely reported that it promoted communication compared to those who did not use WHO SSC routinely (66.3% vs. 30.0%;  $P = 0.0369$ ). Similarly, more respondents who routinely used WHO SSC demonstrated the perception that it could prevent errors (66.7% vs. 22.2%,  $P = 0.0125$ ).

The hospital type ( $P = 0.0001$ ) and perception about prevention of errors were most strongly associated with the routine use of WHO SSC [Table 4]. Respondents working in comprehensive health centers had the least odds of using the WHO SSC (odds ratio [OR]: 0.03,  $P = 0.0438$ ). While those who did not believe it, prevented errors were least likely to use it (OR: 0.08,  $P = 0.0117$ ).

## DISCUSSION

This level of awareness of the WHO SSC demonstrated in this study (93.1%) by physician anesthetists practicing in Nigeria was similar to the findings of Delgado Hurtado *et al.*, who previously reviewed the acceptance of WHO SSC among surgical personnel in Guatemala and reported that a similar proportion of respondents (93.8%) were aware of the checklist.<sup>[8]</sup>

The WHO SSC outlined ten essential objectives for safe surgery that formed the basis for the SSC. The WHO SSC is a 19-item instrument established to assist perioperative health personnel in reducing the frequency of perioperative errors and complications, increase adequate communications and teamwork among operating theater personnel. There are three defined periods for the application of the checklist; a sign in before induction of anesthesia which includes the verification of patient's identity, consent, surgical site, procedure, confirmation of airway evaluation, and equipment check. A timeout is the second period that is taken before surgical incision which confirms all team members by name and role, reviews critical steps, operative duration, anticipated critical events, and confirmation of prophylactic antibiotic if indicated. The checklist concludes with a sign out during or immediately after wound closure before the patient is moved out of the operating room and includes a confirmation of sponge and instrument counts, corrects labeling of specimens and the reviews of key concerns for the recovery and continued care of the patient. It has been found since the introduction to be associated with reductions in the frequency of operative errors and lower rates of adverse events globally including low and middle-income countries.<sup>[9-11]</sup>

Majority of the respondents (90.2%) in this study acknowledged that the checklist enhanced communication in the surgical theatre. This is consistent with previous reports that have demonstrated that the use of checklists enhanced communications across professional lines.<sup>[11-15]</sup> Russ *et al.* in a systematic review of safety checklists came to a conclusion that they are beneficial for operating room teamwork and communication and may be a way through which patient outcomes can be improved.<sup>[16]</sup>

This study reports that 50% of respondents did not apply the checklist at the sign out period out before leaving the

operating room as required. Russ *et al.* reported on the variation in use of the WHO SSC and observed a poor application of the checklist at the sign out period.<sup>[17]</sup>

There is a shortage of trained surgical personnel in developing countries combined with the resource-poor environment and lack of equipment. There is a tendency for the few available personnel to be overworked leading to an increased possibility of medical errors. The surgical checklist may assist in improving communications, reducing errors, and improving patient outcomes.<sup>[18,19]</sup>

Our results show a significantly higher proportion (86.2%) of routine use of the checklist by respondents who work in tertiary/teaching hospitals. This may be attributable to their more structured training, the academic orientation of their clinicians and the hospitals being University hospitals.

The usefulness of WHO SSC was attested to by 93.1% of respondents. This is remarkable in view of the initial reluctance to implement new protocols by healthcare personnel who may be resistant to what is perceived as additional increase to their existing responsibilities.<sup>[18]</sup> In addition, there may be anxiety about the potential for the checklist to consume additional valuable time or distract from traditionally defined responsibilities. Healthcare personnel had shown a capability to apply the WHO SSC within 3–5 min.<sup>[17]</sup>

This study is limited as it was self-reported and conducted among Nigerian physician anesthetists exclusive of other major operating room specialists whose perception and attitudes may differ.

## CONCLUSION

This study identified a high level of awareness and use of the WHO SSC by physician anesthetists in Nigeria. However, its use is mostly in teaching hospitals.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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