

Enhancing Surgical Safety in Conflict Zones: Implementing the WHO Checklist in North Kivu

Améliorer la sécurité chirurgicale dans les zones de conflit : Mise en œuvre de la liste de contrôle de l'OMS au Nord-Kivu

Jacques Fadhili Bake^{1,2}, Claude Kasereka Masumbuko³, Zacharie Tsongo Kibendelwa⁴, Dan Poenaru⁵

Pour citer cet article : Bake JF, Masumbuko CK, Tsongo ZK, Poenaru D. Enhancing Surgical Safety in Conflict Zones: Implementing the WHO Checklist in North Kivu. Kivu Medical Journal 2024 ; 2(2), 1-6.

Article reçu : 04-12-2024

Accepté : 23-12-2024

Publié : 26-12-2024

Publisher's Note: KMJ stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright : © 2024. Bake JF et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited

Correspondance :

Docteur Jacques Fadhili Bake,
Chirurgien général, MMED, COSECSA,

Heal Africa Hospital, RD Congo

fadhilibake@gmail.com
<https://orcid.org/0000-0002-5666-7731>

- 1 University of Goma, Goma, DR Congo
- 2 Institut Supérieur des Techniques Médicales, ISTM, Goma, DR Congo
- 3 Catholic University of Graben, Butembo, DR Congo,
- 4 University of Kisangani, Kisangani, DR Congo,
- 5 McGill University, Montreal, Canada.

Abstract.

Background: The WHO Surgical Safety Checklist (WHO Checklist) has been shown to effectively reduce surgical complications worldwide. However, implementing this checklist in conflict-affected regions like North Kivu, Democratic Republic of Congo (DRC), presents unique challenges. This study investigates the utilization of the WHO Checklist in hospitals across North Kivu to identify barriers and opportunities for improvement.

Methods: A cross-sectional study was conducted across 11 hospitals (5 urban and 6 rural) in North Kivu. Surveys were administered to healthcare professionals, including surgeons, anesthesiologists, and nurses, to assess their knowledge, usage, and perceptions of the WHO Checklist. Data were analyzed using SPSS version 26.

Results: The response rate was 80.3%, with a majority (59.2%) from urban hospitals. The use of the WHO Checklist was inconsistent; 60.1% reported it was not utilized in the operating room. No significant differences in checklist usage were found between urban and rural hospitals ($p=0.516$). Training significantly correlated with the completion rate of checklist phases ($p<0.001$) but not with overall usage ($p=0.057$). Furthermore, there were no significant differences regarding the need for further training to enhance checklist use across rural and urban hospitals ($p=0.334$) or among different professions ($p=0.321$).

Conclusion: While the WHO Checklist has the potential to enhance surgical safety in conflict zones like North Kivu, targeted training programs and tailored interventions are essential for improving its use in similar resource-limited contexts globally.

Keywords: Patient safety, global surgery, Checklist usage, Democratic Republic of Congo

Resumé

Contexte : La Liste de contrôle de sécurité chirurgicale de l'OMS a démontré son efficacité pour réduire les complications chirurgicales dans le monde entier. Cependant, sa mise en œuvre dans des régions touchées par des conflits, comme le Nord Kivu en République Démocratique du Congo (RDC), présente des défis uniques. Cette étude examine l'utilisation de la Liste de contrôle de l'OMS dans les hôpitaux du Kivu Nord afin d'identifier les obstacles et les opportunités d'amélioration.

Méthodes : Une étude transversale a été réalisée dans 11 hôpitaux (5 urbains et 6 ruraux) du Kivu Nord. Des questionnaires ont été administrés aux professionnels de santé, y compris des chirurgiens, des anesthésistes et des infirmiers, pour évaluer leur connaissance, leur utilisation et leurs perceptions de la Liste de contrôle de l'OMS. Les données ont été analysées à l'aide de SPSS version 26.

Résultats : Le taux de réponse était de 80,3 %, avec une majorité (59,2 %) provenant d'hôpitaux urbains. L'utilisation de la Liste de contrôle de l'OMS était insuffisante ; 60,1 % des répondants ont signalé qu'elle n'était pas utilisée en salle d'opération. Aucune différence significative dans l'utilisation de la liste n'a été trouvée entre les hôpitaux urbains et ruraux ($p=0,516$). La formation était significativement corrélée au taux d'achèvement des phases de la liste ($p<0,001$), mais pas à son utilisation globale ($p=0,057$). De plus, il n'y avait pas de différences significatives concernant le besoin d'une formation supplémentaire pour améliorer l'utilisation de la liste de contrôle entre les hôpitaux ruraux et urbains ($p=0,334$) ou parmi les différentes professions ($p=0,321$).

Conclusion : Bien que la Liste de contrôle de l'OMS ait le potentiel d'améliorer la sécurité chirurgicale dans des zones de conflit comme le Nord Kivu, des programmes de formation ciblés et des interventions adaptées sont essentiels pour améliorer son utilisation dans des contextes similaires à ressources limitées à l'échelle mondiale.

Mots-clés : Sécurité des patients, chirurgie mondiale, utilisation de la liste de contrôle, République Démocratique du Congo

Introduction

The World Health Organization surgical safety checklist (WHO Checklist) has emerged as a critical tool in enhancing surgical safety and reducing complications across diverse healthcare settings worldwide [1]. Its implementation has been associated with significant improvements in patient outcomes, including reductions in surgical morbidity and mortality rates [2]. However, the application of the WHO Checklist in conflict-affected regions, such as North Kivu in the Democratic Republic of the Congo (DRC), presents unique challenges that necessitate careful investigation. North Kivu has been marred by prolonged armed conflict, which has severely impacted its healthcare infrastructure and the availability of essential medical resources [3]. The region's healthcare professionals often operate under difficult conditions, characterized by limited access to training, inadequate supplies, and the psychological toll of working in a conflict zone [4,5].

These factors may hinder the effective utilization of safety protocols such as the WHO Checklist. This study aims to explore the utilization of the WHO Checklist in hospitals across North Kivu by assessing healthcare professionals' knowledge, usage, and perceptions regarding the checklist. By identifying barriers to implementation and opportunities for improvement, this research seeks to contribute valuable insights into enhancing surgical safety practices in similar resource-limited contexts globally.

Material and methods

Study Design, Settings, Population and Sampling

This cross-sectional multicenter investigation was carried out between July and September 2024, concentrating on the surgical facilities of twelve hospitals located in North Kivu, a province in eastern

Democratic Republic of the Congo (DRC). The research utilized purposive sampling to identify six rural hospitals and six urban hospitals. The rural hospitals were general referral facilities situated in the health zones of each territorial capital, while the urban hospitals included both state and para-state institutions located in Goma, the provincial capital of North Kivu. The study's target population comprised all healthcare professionals actively engaged in surgical procedures within the operating rooms. This group included Operating Room nurses, anesthetists, anesthesiologists, surgeons, and surgical residents. To guarantee a thorough representation of the surgical workforce, a comprehensive sampling strategy was employed.

Data Collection and Analysis

Based on the study's objectives, a questionnaire consisting of 14 questions was developed and subsequently pretested at an urban institution to ensure its acceptability and comprehensibility. In each hospital participating in the study, a physician designated to the operating room acted as the primary liaison (focal leader), ensuring a comprehensive understanding of the research aims. These local coordinators were tasked with administering the surveys to participants within their respective institutions. Before completing the survey, participants were required to provide informed consent, after which they submitted their completed questionnaires to their local coordinator. Although individual responses were maintained in anonymity, the principal investigator retained the capability to identify the hospitals for future analysis and feedback. Data analysis was conducted utilizing SPSS (Statistical Package for Social Sciences) for Windows, version 26.0. Descriptive statistics were computed to encapsulate the demographic characteristics of the participants. Inferential statistics were applied to explore the disparities in the implementation of the WHO Checklist between urban and rural healthcare facilities, as well as among different professional roles. Additionally, the impact of training on both the utilization of the WHO Checklist and its effective implementation was evaluated. The statistical techniques employed included the Pearson Chi-square test and Fisher's exact test, as deemed appropriate. Moreover, multinomial regression analysis was performed to examine the relationships among various professionals regarding WHO Checklist utilization.

Ethical consideration

The research protocol for this survey was approved by the Research Ethics Committee at the University of

Goma, with support from the University Consortium for the Postgraduate Cycle in Medicine (UNIGOM/CEM/006/2024). Participation in the study was completely voluntary. Participants were given a consent form, which accompanied the data collection sheet. The confidentiality of each participant was guaranteed during both the data collection and analysis phases. Participants were informed of their right to withdraw from the study at any time without any negative consequences.

Results

The study initially aimed to include twelve hospitals. However, during the data collection process, one urban hospital situated in Goma opted out of participation. As a result, the final sample comprised eleven hospitals, with six classified as rural and five as urban. A total of 265 questionnaires were disseminated among these institutions. Upon the conclusion of data collection, 213 completed questionnaires were returned and considered suitable for analysis, yielding an overall response rate of 80.3%. A significant portion of the respondents hailed from urban facilities, accounting for 59.2% of the total. The most frequently represented professionals were surgeons and general practitioners, making up 46.9% of the respondents, followed by operating room nurses at 39.4%. Notably, a majority of the participants (60.1%) had five years or less of professional experience, with 60.1% indicating they did not utilize the WHO Checklist and 59.6% reporting a lack of training in its application. (Table I)

Table I : Background information of the respondents

Variables		Frequency n (%)
Hospital profile	Rural Hospital	87 (40.8)
	Urban Hospital	126 (59.2)
Profession	Surgeon/Physician	100 (46.9)
	Anesthesiologist/nurse anesthetist	29 (13.6)
	OR nurse	84 (39.4)
Years of work in the OR	>5 Years	85 (39.9)
	≤ 5 Years	128 (60.1)
Training on the use of checklist	No	127 (59.6)
	Yes	86 (40.4)
Checklist used	No	128 (60.1)
	Yes	85 (39.9)

The analysis revealed no notable differences between urban and rural facilities in terms of the utilization rate

of the WHO Checklist ($p=0.516$), the overall completion rate ($p=0.166$), the training provided for the use of the WHO Checklist ($p=0.808$), and the necessity for additional training on the WHO Checklist ($p=0.334$). (Table II)

Differences in SSC use between urban and rural hospitals

Table II : Differences in SSC use between urban and rural hospitals

Variables		Rural n(%)	Urban n(%)	p
Total		87(40.8)	126(59.2)	
Use of the WHO Checklist				0.516
	No	50	78	
	Yes	37	48	
Complete completion of the WHO Checklist				0.554
	No	27	44	
	Yes	60	82	
Training on the Use of WHO Checklist				0.166
	No	47	80	
	Yes	40	46	
Knowledge of the 3 phases of the WHO Checklist				0.808
	No	29	40	
	Yes	58	86	
Need of further training				0.334
	No	4	10	
	Yes	83	116	

Differences in checklist use across the professional background

In terms of professional background, a notable disparity was observed in the utilization of the WHO Checklist concerning the professional title ($p=0.025$). Conversely, no significant difference was found in the application of the WHO Checklist in relation to years of experience ($p=0.379$). (Table III).

Professional title using more the WHO Checklist

The multinomial regression analysis indicated that operating room nurses were twice as likely to utilize the surgical safety checklist ($p=0.013$, OR :2.129, 95%

CI :1.172-3.869) in comparison to other operating room professionals. (Table IV)

The training regarding the application of the WHO Checklist did not demonstrate a substantial effect on its utilization ($p=0.057$); however, it was associated with the completion rates of the three phases ($p<0.001$). (Table V)

Table III: Differences in checklist use across the professional background

Variable		Use of WHO Checklist		p
		No	Yes	
Profession				0.025
	Anesthesiologist/nurse anesthetist	20	9	
	Surgeon/GP	67	33	
	OR nurses	41	43	
Experience in OR				0.379
	>5 years	48	37	
	≤ 5 years	80	48	

WHO Checklist used

Table IV : Professional title using more the WHO Checklist

Variable	WHO Checklist used	OR[95% CI]	p
Anesthesiologist/nurse anesthetist	20	0.914[0.375-2.226]	0.842
OR nurses	41	2.129[1.172-3.869]	0.013
Surgeon/GP	67	1	

OR : Odds ratio, CI : Confidence interval

Training on the use of WHO Checklist

Table V. Training received and use of the WHO Checklist

Variables		Training on the use of WHO Checklist		p
		No (n=127)	Yes (n=86)	
Use of the checklist				0.057
	No	83	45	
	Yes	44	41	
Completion of the 3 phases				<0.001
	No	61	10	
	Yes	66	76	

Discussion

The aim of this study was to assess the current utilization of the WHO Checklist and identify barriers to its implementation in healthcare facilities located in the conflict-affected region of North Kivu, in eastern DRC.

In conflict zones delivering quality healthcare services presents significant challenges, these challenges stem from the disorganization of services and routine care delivery systems, the increasing health needs of the population, the complexity and unpredictability of available resources, and the susceptibility to multiple public health crises [6,7]. In North Kivu, a region marked by ongoing violence and instability for decades [8], the implementation of the WHO Checklist emerges as a critical intervention to enhance surgical safety and patient outcomes. This study reveals significant insights into the current utilization of the WHO Checklist among surgical professionals in this region, highlighting both the obstacles and opportunities for improvement.

Our survey achieved an impressive overall response rate of 80.3%, with a significant portion of respondents (59.2%) working in urban facilities. Alarming, 60.1% of these healthcare providers reported not utilizing the WHO Checklist, and a similar percentage indicated they had not received formal training on its implementation. Despite growing evidence supporting the WHO Checklist's effectiveness in enhancing surgical outcomes, its adoption varies widely across countries, particularly in low- and middle-income settings [2,9–11].

This disparity highlights the urgent need for targeted training to improve the use of the WHO Checklist and ultimately enhance patient safety in surgical environments.

The analysis of urban and rural healthcare facilities revealed no significant differences in the usage and completion rates of the WHO Checklist, nor in the training received or the perceived need for additional training. A study by Lyons and Popejoy supports these findings, indicating comparable rates of WHO Checklist implementation across both rural and urban settings [12]. This suggests that despite the varying contexts, healthcare providers in both environments face similar challenges regarding checklist utilization and training, highlighting the need for standardized approaches to enhance patient safety culture universally.

Our analysis identified a significant difference in the utilization of the WHO Checklist based on professional background, revealing that operating room nurses were twice as likely to employ the WHO Checklist compared to their surgical counterparts ($p=0.013$). This finding underscores the essential role of nurses in the operating

room, particularly in ensuring adherence to established safety protocols. The literature supports this observation, highlighting the pivotal influence of nursing leadership on enhancing surgical safety outcomes [13]. Furthermore, studies indicate that nurses frequently take the initiative in conducting and documenting the surgical checklist across diverse clinical settings [14–16]. Interestingly, our study found no significant correlation between WHO Checklist utilization and years of experience among staff. This suggests that both novice and seasoned healthcare professionals encounter similar challenges in implementing safety measures, indicating a potential need for systemic improvements in training and support for all personnel involved in surgical care.

Training was identified as a crucial factor influencing the completion rates of checklist phases ($p<0.001$), highlighting the necessity for focused educational interventions. However, the analysis revealed no statistically significant difference in overall checklist usage based on the training received ($p=0.057$). This suggests that merely providing training may not be adequate to guarantee consistent implementation of the checklist among all surgical teams. These results align with existing literature [17,18], which emphasizes the importance of continuous education in integrating safety protocols into standard surgical practices.

Therefore, it is imperative to develop and implement comprehensive educational strategies that not only introduce training but also promote ongoing learning and adherence to safety measures within surgical environments. This approach may enhance the effectiveness of checklist utilization and ultimately improve patient outcomes in surgical settings.

Limitations

This study presents several limitations. Firstly, the cross-sectional design may restrict the ability to establish causal relationships between training and checklist usage, as it captures data at a single point in time. Additionally, the reliance on self-reported surveys could introduce response bias, as healthcare professionals may provide socially desirable answers regarding their knowledge and use of the checklist. To mitigate this, we encouraged our focal leaders to create an environment where respondents would feel confident and secure in their answers.

Lastly, the study does not account for external factors such as resource availability or institutional support that could influence the effective application of the WHO Checklist in these challenging environments.

Conclusion

While the WHO Checklist has the potential to enhance surgical safety in North Kivu's conflict-affected healthcare environment, its effective implementation requires concerted efforts focused on education and fostering a culture of safety among surgical teams. By addressing these barriers, healthcare providers in North Kivu can work towards creating safer surgical practices that ultimately lead to better patient outcomes. Future research should aim to evaluate the effectiveness of implemented training programs and explore additional factors influencing checklist utilization in similar resource-limited settings globally.

Conflicts : None

Authors contributions : JFB and DP designed the study. JFB was responsible for data collection and statistical analysis. DP, KMC and TKZ supervised the study. All authors have read and approved the final revised version of the manuscript.

References

1. Safety WP, World Health Organization. Implementation manual WHO surgical safety checklist 2009: safe surgery saves lives. 2009.
2. Haynes AB, Weiser TG, Berry WR, Lipsitz SR, Breizat AHS, Dellinger EP, et al. A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population. 2009;491–9.
3. Kambere O. Intersecting realities : Exploring the nexus between armed conflicts in eastern Democratic Republic of the Congo and Global Health. One Heal [Internet]. 2024;19(July):100849.
4. Makali SL, Lembebu JC, Boroto R, Zalinga CC, Bugugu D, Lurhangire E, et al. Violence against health care workers in a crisis context: a mixed cross-sectional study in Eastern Democratic Republic of Congo. *Confl Health*. 2023;17(1):1–11.
5. Altare C, Castelgrande V, Tosha M, Malembaka B. From Insecurity to Health Service Delivery : Pathways and System Response Strategies in the Eastern Democratic Republic of the Congo. 2021;915–27.
6. Debarre A. Hard to Reach: Providing Healthcare in Armed Conflict. *Int Peace Inst* [Internet]. 2018;(December):1–40.
7. OMS. La qualité des soins de santé dans les zones fragiles, touchées par des conflits ou vulnérables [Internet]. 2021. 84 p.
8. International Comitee of the Red Cross. The forgotten people of north Kivu: focus on the humanitarian crisis in this province of the Democratic Republic of the Congo. 2024;(March).
9. Weiser TG, Haynes AB. Ten years of the Surgical Safety Checklist. 2018;927–9.
10. Jain D, Sharma R, Reddy S. Review Article WHO safe surgery checklist: Barriers to universal acceptance Why do We Need Checklist? Effectiveness of Checklist : Evidence in. 2018;7–10.
11. Vohra RS, Cowley JB, Bhasin N, Barakat HM, Gough MJ. Attitudes towards the surgical safety checklist and factors associated with its use : A global survey of frontline medical professionals *. *Ann Med Surg*. 2015;4(2):119–23.
12. Lyons VE, Popejoy LL. Time-Out and Checklists. 2017;32(1).
13. Hussein AM. Enhancing Patient Safety in the Operating Room: A Comprehensive Guide from a Nurse's Perspective. *Open J Nurs*. 2024;14(06):252–66.
14. Ališić E, Krupić M, Alić J, Grbić K, Mašić N, Parvaneh S, et al. The Role of an Assistant Nurse in Implementing the WHO Surgical Safety Checklist: Perception and Perspectives. *Cureus*. 2023;15(5).
15. Domingo L, Sala M, Miret C, Montero-Moraga JM, Lasso de la Vega C, Comas M, et al. Perceptions from nurses, surgeons, and anesthesiologists about the use and benefits of the surgical checklist in a teaching hospital. *J Healthc Qual Res*. 2022;37(1):52–9.
16. Girma T, Mude LG, Bekele A. Utilization and Completeness of Surgical Safety Checklist with Associated Factors in Surgical Units of Jimma University Medical Center, Ethiopia. *Int J Gen Med*. 2022;15(October):7781–8.
17. Dirie NI, Elmi AH, Ahmed AM, Ahmed MM, Omar MA, Hassan MM, et al. Implementation of the WHO surgical safety checklist in resource-limited Somalia: a new standard in surgical safety. *Patient Saf Surg*. 2024;18(1).
18. Ngonzi J, Bebell LM, Boatina AA, Owaraganise A, Tiibajuka L, Fajardo Y, et al. Impact of an educational intervention on WHO surgical safety checklist and pre-operative antibiotic use at a referral hospital in southwestern Uganda. *Int J Qual Heal Care*. 2021;33(3):1–7