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Effectiveness of a preoperative checklist in reducing surgery cancellations in a tertiary hospital in a low-income country

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Abstract.
Background: A high surgery cancellation rate has been a problem at Muhimbili National Hospital for a decade, ranging from 16% to 29%, with patient factors accounting for up to 40% of cancelled surgeries. One critical aspect of addressing the problem was the implementation of a preoperative checklist to double-check the preoperative workup and reduce cancellations due to patient factors. This paper aimed to determine the effectiveness of a preoperative checklist in reducing the cancellation rate of planned surgeries.
Methods: A 6-month quasi-experimental study was conducted at Muhimbili National Hospital. We enrolled 298 and 300 patients in the control and interventional phases, respectively. The data was gathered using a pre-tested checklist, coded, entered, and analysed using SPSS version 22.0.
Results: The checklist implementation reduced the cancellation rate from 19.1% to 16.3%, with patients' factors significantly decreasing from 46 (15.4%) in the control group to 14 (4.7%). p=0.000.
Conclusions: A preoperative checklist reduces cancellations due to patient factors and is a promising tool for reducing surgery cancellations. It is recommended that the preoperative checklist be used regularly at MNH to reduce surgical cancellations.

Keywords: preoperative checklist, surgery cancellation

Background.

The planned surgery combines the necessary teams to prepare materials, theatre space, and timing. Mental and psychological preparation is required for the patient and his or her family (Chalya et al., 2011). Patients and hospitals suffer significantly when an operation is cancelled on the surgery day (Mohammed et al. et al., 2015; Dix and Howell, 2001). The global burden of cancellation rates ranges from 4% to 17% of planned surgeries (Ebrahimipour et al., 2014). The most common reasons for cancellation are patient-related, such as incomplete preoperative workups, changes in the patient's clinical status, and the patient failing to appear on the day of surgery; hospital-related factors include time constraints, operating room unavailability due to previous operations being delayed, interference with emergency operations, insufficient postoperative ICU beds, and default anaesthetic machines (Schofield et al., 2005).

The rate of cancellation of elective surgeries at Muhimbili National Hospital (MNH) has been observed to be high, with patients' related factors contributing a high percentage (Mbembati et al., 2008); efforts to improve the situation have been laid out, such as establishing a preoperative anesthesia clinic and performing preoperative workups for inpatients and outpatients before listing

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patients for surgery, but the trend has remained the same. As a result, it emphasized the importance of instituting a preoperative checklist to address patient-related factors. The preoperative checklist under consideration is a locally designed checklist that includes components for patient identification, diagnoses, the type of surgery to be performed, and preoperative investigations (laboratory, imaging, and pathological).

This checklist has never been used before, but its implementation is intended to reduce errors in preoperative workups of patients scheduled for surgery, thereby lowering the cancellation rate of scheduled surgeries on the day of surgery. Surgeons should use this checklist before sending the patient to the operating room. Whether using a preoperative checklist will reduce the cancellation rate of planned surgery is still unknown in our settings. Our objective was to determine the effectiveness of a preoperative checklist in reducing the cancellation rate of planned surgeries. A preoperative checklist is essential because it ensures efficient management of the nation's insufficient theatre space for referred cases and avoids frustration for patients and hospital staff. The data obtained from this study will be used to plan elective surgeries effectively.

Methods

We conducted a hospital-based, quasi-experimental study in the surgical department of Muhimbili National Hospital in Dar es Salaam, Tanzania. This tertiary hospital has patients from all over the country.

Study duration: Our study lasted six months and was divided into control and experimental phases, each lasting three months. The control phase lasted three months, from 1 June to 31 August 2017, and the experimental phase lasted three months, from 1 November 2017 to 31 January 2018. During the two phases of the study, all patients listed for elective surgery in Firm I and II of the Surgical Department at MNH were included.

Data collection

During the control phase, baseline data on the rate of surgery cancellations on the day of surgery were collected. The preoperative checklist was not used during this phase, and data on cancelled cases and reasons for cancellations were collected. Once the operation list was available in the ward, the preoperative checklist was attached to the patient's files and completed under the supervision of the resident surgeon. While filling out the checklist, any missing or derangements in patients' preoperative workups were discovered and corrected.

If the derangements were not expected to be corrected before the scheduled surgery, a senior surgeon was contacted to discuss possibly cancelling the surgery and finding a replacement. The data on the cancelled cases and the reasons for cancellations was then gathered. Patients were enrolled in the study in both phases once the operating list was available in the ward and then followed up until the day of discharge from the hospital.

Data management and analysis

The principal investigator reviewed the collected data for completeness and errors. The data was cleaned, coded, and entered SPSS version 20 for analysis. The data was backed up on a CD and in the principal investigator's email. All data were collected using a pre-tested checklist, and the research team double-checked the information for completeness and consistency. All collected data were analyzed using the SPSS computer package version 22.0.

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Ethical approval

The MUHAS research ethics committee approved the study, and the MNH Teaching, Research, and Consultancy Coordination Unit approved data collection.

Results

During this study, 598 people were scheduled for elective surgery, with 298 in the control group and 300 in the interventional group. The mean age of patients in both study groups was comparable. In the intervention and control groups, females outnumbered males by 1.5:1 and 1.2:1, respectively. In both study groups, participants with malignant disease were listed for surgery at a higher rate than those with benign disease, by a ratio of 1.5 to 2 in the interventional and control groups, respectively. However, as shown in Table 1, the differences between the study groups were not statistically significant.

Table 1: Characteristics of patients in the two study groups

Characteristics	Interventional (n=300) f (%)	Controls (n=298) f (%)	P value
Age:			
11 – 30	42 (14.0)	52 (17.4)	
31 – 50	145 (48.3)	114 (38.3)	
51 – 70	86 (28.7)	102 (34.2)	
>70	27 (9.0)	30 (10.1)	0.098
Mean age (years)	47.2±16.9	47.8±16.2	0.671
Sex:			
Male	119 (39.7)	134 (45.0)	
Female	181 (60.3)	164 (55.0)	0.190
Disease groups			
Benign diseases	122 (40.7)	99 (33.2)	
Malignant diseases	178 (59.3)	199 (66.8)	0.059

Table 2 shows that the two study groups cancelled 106 (17.7%) of the 598 planned surgeries. The number of cancelled surgeries decreased from 57 (19.1) in the control group to 49 (16.3%) in the interventional study group, with an odds ratio (OR) of 1.03, indicating that participants in the interventional group were 3% more likely than controls to be operated on.

Table 2: Number of surgeries cancelled and reasons for cancellation in the study groups

Surgery	Interventional group n=300 f (%)	Control group n=298 f (%)	Total N=598 f (%)
Done	251 (83.7)	241 (80.9)	492 (82.3)
Cancelled	49 (16.3)	57 (19.1)	106 (17.7)
Total	300 (100.0)	298 (100.0)	598 (100.0)

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Table 3 shows that after implementing the checklist, patient-related factors decreased significantly from 46 (15.4%) in the control group to 14 (4.7%); this finding was statistically significant, p = 0.000. The interventional group experienced 35 (11.7%) more cancellations due to hospital-related factors than the control group, which was statistically significant (p = 0.000).

Table 3: Reasons for cancellation of surgeries in the two study groups

Reason	Interventional (n=300) f (%)	Control (n=298) f (%)	Total (N=598) f (%)	P value
Patient factors	14 (4.7)	46 (15.4)	60 (10.0)	0.000
Hospital factors	35 (11.7)	11 (3.7)	46 (7.7)	0.000
Total	49 (16.3)	57 (19.1)	106 (17.7)	

Table 4 shows a reduction in the number of surgeries cancelled due to incomplete lab workups, incomplete investigations (i.e., ECG, ECHO, colonoscopy, bronchoscopy), anemia, prolonged bleeding indices (coagulopathy), and hypokalemia, though the reduction was not statistically significant

Table 4: Patient-related factors in cancellation rates

Patient related factors	Interventions (n=300) f (%)		Controls (n=298) f (%)		P value
Incomplete lab works	1	(0.3)	8	(2.7)	0.018
Incomplete other investigations	1	(0.3)	7	(2.3)	0.03
Hypokalemia	5	(1.7)	13	(4.4)	0.54
Anemia	5	(1.7)	9	(3.0)	0.274
Prolonged bleeding indices	0	(0.0)	3	(1.0)	0.081
Absconded	0	(0.0)	4	(1.3)	0.044
Hypertension	2	(0.8)	3	(1.0)	0.648
Hypotension	0	(0.0)	2	(0.7)	0.155
No consent	0	(0.0)	2	(0.7)	0.155
Unstable patient	0	(0.0)	2	(0.7)	0.155
Bradycardia	0	(0.0)	1	(0.3)	0.315
Died before day of surgery	0	(0.0)	2	(0.7)	0.155
Patient refuse surgery	2	(0.7)	1	(0.3)	0.567
Family refuse surgery	0	(0.0)	1	(0.3)	0.315
Wrong diagnosis	1	(0.3)	0	(0.0)	0.319
Change of plan	2	(0.7)	0	(0.0)	0.158
Total	19	(6.3)	57	(19.1)	

* A patient may have had multiple reasons for cancellation.

Theatre renovation accounted for most cancelled surgeries in the case group (17 (5.7%), followed by time-barred 13 (4.3%); however, time-barred was the main factor in the control group, as shown in Table 5 below.

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Table 2: Hospital-related factors in cancellation rate

Hospital related factors	Interventions (n=300) f (%)	Controls (n=298) f (%)	P value
Theatre renovation	17 (5.7)	1 (0.3)	0.000
Time barred	13 (4.3)	9 (3.0)	0.394
No ICU bed	1 (0.3)	1 (0.3)	0.996
No ETT Right lung	1 (0.3)	0 (0.0)	0.319
No laparoscopic tower	2 (0.7)	0 (0.0)	0.158
No mesh	1 (0.3)	0 (0.0)	0.319
Total	35 (11.7)	11 (3.7)	0.000

Discussion

Cancellation of surgery on the day of surgery has been a significant concern in surgical practices worldwide, including ours. As a result, the purpose of this study was to highlight the current status of the rate of surgery cancellation at MNH and the impact of the preoperative checklist in ensuring that listed patients meet the minimum set criteria to be fit for elective surgery. In our study, age did not affect the cancellation of the operation between the two study groups, and the difference in mean and different age groups between the control and interventional groups was not statistically significant, like other studies (Haynes et al., 2009, Baradaran Binazir et al., 2016). Furthermore, there were no significant differences in patients' sex or diagnoses between the interventional and control groups, implying that they did not affect the rate of cancellation or patient outcome in this study.

The cancellation rate of surgeries on the day of surgery at MNH has been a significant issue for the past decade. According to our findings, one out of every five planned surgeries in the control group is cancelled. On the other hand, implementing the preoperative checklist resulted in a 3% decrease in cancellations. The preoperative checklist was completed a day before surgery, allowing for earlier detection of missing laboratory workups and ordering them accordingly. Early detection of derangements in the patients' laboratory workup, such as anemia and electrolyte imbalances, was also detected earlier, and corrections were initiated immediately.

However, for those derangements that could not be corrected immediately, such as severe anemia with a hemoglobin level of less than 5 g/dl, operations were cancelled before the day of surgery, efforts to find replacements from the inpatients failed in most attempts, and unfortunately, the two surgical firms were not accustomed to preparing a waiting list for outpatients who are ready for surgery to be contacted whenever an opportunity to operate arises. However, higher cancellation rates were observed in other African hospitals (Chalya et al., 2011, Elrahman et al., 2014, Ebirim et al., 2012). Our study found that patient factors were responsible for one out of every six cancelled surgeries in the control group; however, using a preoperative checklist reduced the contribution of patient factors by 11% because patients' factors were detected and corrected before the day of surgery.

If the preoperative checklist could have been completed before patients were listed for elective surgery, it could have had a more significant impact (than what was found in the study) in reducing the number of cancelled surgeries due to patient-related factors; thus, the list of patients for elective surgery would be comprised of only those patients cleared by the preoperative checklist to be ready

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for surgery. In the same setting, as well as in other centres, higher contributions of patient-related factors to surgery cancellation were observed at 40 %(Ebirim et al., 2012, Elrahman et al., 2014) Cancellation of surgeries due to hospital-related factors contributed significantly to 12% in the interventional group versus 4% in the control group; this is because, unlike the rate reported by previous studies, the use of a preoperative checklist aimed at minimizing patient-related factors rather than hospital-related factors.

Conclusion

This study found that using a preoperative checklist reduced the number of cancellations due to patient factors. If all patients are cleared by it, a preoperative checklist is a promising tool for reducing the cancellation rate of planned surgeries.

Contribution of the author

All authors contributed equally to completing this work and have read and approved the final manuscript version.

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Conflict of Interest: None.

References

Baradaran Binazir, M., Alizadeh, M., Nikasa, P., Azhough, R. & Movassaghi, R. 2016. The Effect of a Modified WorldHealth Organization Surgical Safety Checklist on Postoperative Complications in a Tertiary Hospital in Iran, 2012. *European Journal of General Medicine,* 13.

Chalya, P. L., Gilyoma, J., Mabula, J. B., Simbila, S., Ngayomela, I., Chandika, A. & Mahalu, W. 2011. Incidence, causes and pattern of cancellation of elective surgical operations in a university teaching hospital in the Lake Zone, Tanzania. *African health sciences,* 11.

Dix, P. & Howell, S. 2001. Survey of cancellation rate of hypertensive patients undergoing anaesthesia and elective surgery. *British journal of anaesthesia,* 86**,** 789-793.

Ebirim, L., Buowari, D. & Ezike, H. 2012. Causes of cancellation of elective surgical operations at a University Teaching Hospital. *J Med Med Sci,* 3**,** 297-301.

Ebrahimipour, H., Shirdel, A., Rahimi, M. E., Meraji, M., Hooshmand, E., Pourtaleb, A., Mohammad Pour, E., Dehghani, A. & Vafaee Najar, A. 2014. A study on the frequency and the reasons for cancellation of surgical operations in Khatam Hospital (Mashhad, Iran) in 2013. *Journal of Patient Safety & Quality Improvement,* 2**,** 156-159.

Elrahman, A. A., Hamza, A. A. & El-Haj, M. A. 2014. Cancellation of elective general surgical operations at the day of intended surgery. *Glob J Med Res,* 14.

Haynes, A. B., Weiser, T. G., Berry, W. R., Lipsitz, S. R., Breizat, A.-H. S., Dellinger, E. P., Herbosa, T., Joseph, S., Kibatala, P. L. & Lapitan, M. C. M. 2009. A surgical safety checklist to reduce morbidity and mortality in a global population. *New England journal of medicine,* 360**,** 491-499.

Mbembati, N. A., Mwangu, M., Muhondwa, E. & Leshabari, M. M. 2008. Performance indicators for quality in surgical and laboratory services at Muhimbili national hospital (MNH) in Tanzania. *East African Journal of Public Health,* 5**,** 13-16.

https://dx.doi.org/10.4314/thrb.v25i4.25

Mohammed Al Khawalde, D., Faisal Al Gudah, M., Nidal Al Soud, M. & Mohammed Al Hroot, M. 2015. Cancellation of elective surgical procedures, a single royal medical services hospital experience. *Journal of the Royal Medical Services,* 22**,** 52.

Schofield, W. N., Rubin, G. L., Piza, M., Lai, Y. Y., Sindhusake, D., Fearnside, M. R. & Klineberg, P. L. 2005. Cancellation of operations on the day of intended surgery at a major Australian referral hospital. *Medical Journal of Australia,* 182**,** 612-615.