

Orthopaedic surgical treatment delays at a tertiary hospital in sub Saharan Africa: Communication gaps and implications for clinical outcomes

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ABSTRACT

Background: Delay in surgical treatment is a source of distress to patients and an important reason for poor outcome. We studied the delay before carrying out scheduled operative orthopaedic procedures and the factors responsible for it. **Materials and Methods:** This prospective study was carried out between March 2011 and December 2012. Temporal details of the surgical procedures at our hospital were recorded in a proforma including the patients' perception of the causes of the delay to surgery. Based on the urgency of the need for surgery, patients were classified into three groups using a modification of the method employed by Lankester *et al.* Data was analyzed using the Statistical Package for the Social Sciences, version 17.0. Predictors of surgical delay beyond 3 days were identified by logistic regression analysis. **Results:** Two hundred and forty-nine patients with a mean age 36.2 ± 19.2 years and M:F ratio 1.3 were recruited. 34.1% were modified Lankester group A, 45.4% group B and 20.5% group C. 47 patients (18.9%) had comorbidities, hypertension being the commonest (22 patients; 8.8%). Median delay to surgery was 4 days (mean = 17.6 days). Fifty percent of emergency room admissions were operated on within 3 days, the figure was 13% for other admissions. Lack of theatre slot was the commonest cause of delay. There was full concordance between doctors and patients in only 70.7% regarding the causes of the delay. In 15.7%, there was complete discordance. Logistic regression analysis confirmed modified Lankester groups B and C ($P = 0.003$) and weekend admission ($P = 0.016$) as significant predictors of delay to surgery of >3 days. **Conclusion:** Promptness to operative surgical care falls short of the ideal. Theatre inefficiency is a major cause of delay in treating surgical patients in our environment. Theatre facilities should be expanded and made more efficient. There is a need for better communication between surgeons and patients about delays in surgical treatment.

Key words: Africa, communication, orthopaedic surgery, trauma, treatment delays

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INTRODUCTION

Delay in surgical treatment is a source of distress to patients, an important reason for poor outcome and a significant contributor to surgical deaths especially in hip fractures.¹⁻⁵ Time measurement studies have shown that delay before diagnosis and treatment is associated with increased risk of complications.⁶ One method of evaluating compliance with standards of "best surgical practice" in terms of promptness to operating on surgical cases will

involve determining the delay encountered before treating such patients as exemplified in the study by Lankester *et al.*⁷ In hip surgery for example, a number of factors have been identified as reasons for delaying surgery which include waiting to optimize the medical condition of the patient, delay in granting of consent by the patient, lack of theatre slots, delay in obtaining results of laboratory investigations, as well as unfavourable time of admission of patients.⁸ Understanding the causes of treatment delays facilitates improved services and early treatment. By mitigating such causes, patients' pain and frustration as well as hospital stay and cost of treatment is reduced.

Whenever there are delays in the operative treatment of patients, it is imperative that the surgical team explains the development to the patient. This not only allays the patient's anxiety, but also reduces the likelihood of litigation even when there are complications like joint stiffness, infections and death arising from such a delay.^{9,10} This study assessed

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the factors responsible for the delay, as well as the degree of concordance in perception of the causes of such delays between the surgical team and the patients/relations.

MATERIALS AND METHODS

This is a prospective observational study of consecutive orthopaedic patients undergoing surgery (elective and emergency) between March 2011 and December 2012 at our teaching hospital. Our department admits patients with various types of musculoskeletal disorders and injuries some of whom are referred to other facilities based on patients' preferences or take their own discharge against medical advice. Elective cases are usually admitted through the clinics (which are held two days a week) before the scheduled surgeries. Elective operations are carried out Mondays to Fridays while emergencies are done every day including weekends. The orthopaedic unit has a dedicated operating theatre where two lists are run weekly. This is supplemented by the emergency theatre where five elective orthopaedic operation lists are run fortnightly apart from unrestricted emergency orthopaedics and trauma operations daily, including night time, weekends inclusive.

Approval for the study was obtained from the state ethics review board. A questionnaire was designed for all patients who underwent operative orthopaedic procedures at our hospital. It was administered within the first week of surgery before the patient was discharged, or at the first post-operative clinic visit for those patients who underwent day case surgery after obtaining informed consent from them. Patients were excluded on account of lack of consent for inclusion, being missed out of the evaluation or misplaced proforma. Demographic characteristics, day and date of admission, type of surgery, dates decision to operate was taken, operation dates, diagnoses and comorbidities were obtained from hospital records at the time of surgery and filled in the study protocol while the reasons for delaying surgeries from the point of view of the operating team (obtained from the case records; the practice in our hospital is for the managing teams to document reasons for treatment delays in the patient's notes) and of the patient were documented. The delay to surgery was taken as the interval between the date a decision to operate was taken and the date the operation was eventually carried out. Further details like the American Society of Anaesthesiologists (ASA) score and the preoperative haematocrit were documented for each patient.

Based on the urgency of the need for surgery, we classified the patients into three groups using a modification of the method employed by Lankester *et al.*, which we expanded to include non-trauma cases.⁷

Group A: Open fractures, dislocations, limb injuries associated with vascular compromise, compartment

syndrome, acute osteomyelitis, acute septic arthritis, etc., who should have definitive treatment within 6 hours of admission.

Group B: Hip fractures, closed long bone fractures, ankle fractures, limb gangrene, removal of severe implant infection, etc. who should be operated upon on the day they presented, or on the day they are declared fit/ready for surgery.

Group C: tendon injuries, simple hand fractures, cold abscesses, limb deformities requiring surgical correction, malunion or non-union of fractures, chronic osteomyelitis, carpal tunnel syndrome, etc who should have surgery done within 5 days or more of presentation.

The data obtained was transferred to a computer spreadsheet and analyzed using the Statistical Package for the Social Sciences (SPSS Inc.) version 17.0. Categorical data like the modified Lankester grouping of patients were compared using the Chi-squared test, *P*-value of <0.05 was regarded as significant. Continuous variables like ages of patients, and duration of the delay (in days) were expressed as mean \pm SD (standard deviation). Primary outcome measures for the study included the duration of delay between the time when a decision to operate was taken and the date the surgery was eventually carried out, the causes of such delays and a comparison with the patients' perspective of the causes of delay.

Secondarily, logistic regression analysis was conducted to identify predictors of surgical delay beyond 3 days. Results are presented with the aid of tables and diagrams.

RESULTS

Two hundred and forty-nine patients were recruited out of a total of 316 cases operated on during the period (78.8%). These consisted of 139 males (55.8%) and 110 females. Sixty-seven (67) patients who did not meet the criteria for inclusion were excluded. Mean age was 36.2 ± 19.2 years (range = 2-90 years). Table 1 shows the age distribution of the subjects.

One hundred and twenty-six cases presented through the emergency department while the rest were admitted through the outpatient clinics or referred to orthopaedic service from other specialties while they were on admission. Seventy-eight percent of the patients were

Table 1: Age distribution of patients

| Age | Number of Subjects (%) |
|----------------|------------------------|
| Up to 15 years | 39 (15.8) |
| 16-40 years | 114 (46.2) |
| 41-65 years | 72 (29.1) |
| >65 years | 22 (8.9) |
| Total | 247 (100.0) |

* The ages of two patients were missing

admitted between Monday and Friday while the remaining came in between Saturday and Sunday. Using the modified Lankester classification, 85 patients (34.1%) were classified into group A, 113 (45.4%) in group B, and 51 patients (20.5%) as group C. Forty-seven (18.9%) patients had comorbidities, the commonest of which was hypertension (22 patients; 8.8%). An average of two units of blood was transfused preoperatively (range 1-8 units) for a mean haematocrit of 23.2 ± 6.2 . Median delay to surgery was 4 days (mean = 17.6 days; 8.9 days for emergency room admissions, 51.1 days for other cases; $t = -6.261$; $P = 0.001$). Fifty percent of emergency room admissions were operated on within 3 days, 84% within the first week; the proportions were 13% and 23%, respectively, for other admissions. Table 2 compares the portal of admission of patients with the modified Lankester groups. The duration of delay in operating on the patients was evaluated for each of the modified Lankester groups and the portal of admission. Results are presented in Table 3.

Lack of theatre slot was the commonest cause of delay; Figure 1 shows the details of the reasons for delay in carrying out the proposed surgeries. The percentage of surgeries postponed for clinical reasons was only 14.3% and comorbidities as a cause of delay was almost twice as common amongst patients who had their operations delayed longer than 7 days. There was full concordance between doctors and patients in only 70.7% regarding the causes of the delay and this was slightly lower in the emergency room admissions (69.4%). In 39 patients (15.7%), there was complete discordance between the

surgical team's reasons for delay with respect to those of the patients.

A logistic regression analysis was conducted to predict the occurrence of surgical delay greater than 3 days using age group, gender, haematocrit, presence of comorbidities, time of the week (weekday/weekend) patients were admitted and the ASA scores of the patients as predictors. A test of the full model against a constant only model was statistically significant, showing that the predictors as a set reliably distinguished between the occurrence of surgical delay of greater than 3 days and early surgical intervention (Chi-square = 43.2773; $P < 0.001$; $df = 12$). Nagelkerke's R^2 was 0.280 showing a weak relationship between predictors and the outcome (i.e., delay beyond 3 days) meaning that only 28% of the predictors influenced outcome. However, prediction success overall was 70.8%; 61.5% for early surgical intervention and 77.6% for delay beyond 3 days.

Table 2: Distribution of patients according to the modified Lankester groups and the corresponding portals of admission

| Portal of Admission | Group A (%) | Group B (%) | Group C (%) | Total (%) |
|---------------------|-------------|-------------|-------------|-------------|
| Emergency room | 81 | 97 | 8 | 186 (74.7) |
| Outpatients' clinic | 3 | 15 | 40 | 58 (23.3) |
| Other | 1 | 1 | 3 | 5 (2.0) |
| Total | 85 (34.1) | 113 (45.4) | 51 (20.5) | 249 (100.0) |

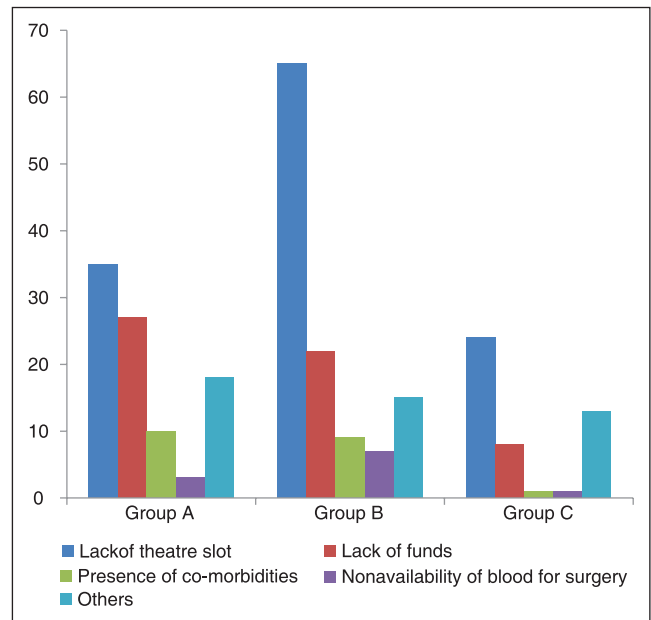


Figure 1: Causes of operative treatment delays for the different modified Lankester groups

Table 3: Duration of delay before operating on orthopaedic patients according to the modified Lankester grouping and the portal of admission

| | Within 3 Days | 3-7 Days | 1-3 Weeks | 3-6 Weeks | 6-13 Weeks | > 3 Months | Total (%) |
|--------------------------|---------------|-----------|-----------|-----------|------------|------------|-------------|
| Modified Lankester group | | | | | | | |
| Group A | 42 | 16 | 7 | 2 | 2 | 2 | 71 |
| Group B | 45 | 39 | 8 | 3 | 0 | 4 | 99 |
| Group C | 7 | 3 | 11 | 6 | 8 | 9 | 44 |
| Total (%) | 94 (43.9) | 58 (27.1) | 26 (12.2) | 11 (5.1) | 10 (4.7) | 15 (7.0) | 214 (100.0) |
| Portal of admission | | | | | | | |
| Emergency room | 86 | 53 | 13 | 5 | 3 | 3 | 163 |
| Outpatients' clinic | 8 | 5 | 11 | 6 | 6 | 11 | 47 |
| Total (%) | 94 | 58 | 24 | 11 | 9 | 14 | 210 |

Modified Lankester group A, B, C median (mean) is 2 (10.5) days, 4 (10.1) days, 22 (46.1) days, respectively

The Wald criterion demonstrated that the significant contributors to prediction of occurrence of surgical delay in this study were the modified Lankester group of the patient ($P = 0.003$) and whether the patient was admitted on a weekend or weekday ($P = 0.016$). The age, gender, PCV group, presence of comorbidities and ASA scores were not significant predictors of surgical delay among the subjects assessed in this study ($P = 0.933, 0.264, 0.506, 0.385$ and 0.063 , respectively). Considering the modified Lankester classification of cases, the likelihood of delay beyond 3 days increases from group A through group B to group C patients. Patients admitted on weekends are more likely to encounter delay beyond 3 days before their surgical operations are carried out.

DISCUSSION

No hospital so far has been able to fully resolve the issue of operative delays. This is due to the fact that the demand for operating services usually outstrips the available facilities. Waiting lists for surgeries are a norm in most surgical specialty clinics and are usually a source of concern for hospital managers the world over. Therefore, most centres around the world regularly audit their theatre services in order to reduce the delay before surgery to the barest minimum. There are standards against which current practices should be appraised. However, such standards are not readily available in our part of the world. As far as the authors are aware, there is no published data in our environment with regards to delay before surgery in orthopaedic patients and this paper is an attempt at filling that void.

There is significant delay before operative orthopaedic treatments in our facility. We used the median as a summary measure due to the fact that the extent of the delay to surgery exhibited a skewed distribution. This study also demonstrates that surgeons appear not to always take time to explain the reasons for delaying the patient's surgery irrespective of whether it is an emergency or elective. There is, however, the possibility that even in cases where such explanations were provided, they may not have been understood by the patients and their relations. It is important that the surgeon talks to his patient at every opportunity to allay the patient's anxiety as well as foster professional rapport. The patient's opinion should always count. That is, the surgical patient must always have up-to-date information about his surgery, when it is scheduled to take place, why such a time was chosen for the procedure and why the surgery did not hold at the appointed time and date. This is without prejudice to the other traditional motions of obtaining an informed consent from the patient prior to any surgical operation. Our practice is to explain the urgency of each procedure to the patient as well as the likely complications (death, loss of the limb, infections,

etc.) which may follow delay or refusal of such procedures. These discussions are documented in the patients' notes for medicolegal reasons.

The fact that the urgency (modified Lankester) grouping was a significant predictor of delay before operative treatment with the most emergent cases being less likely to be delayed might be some credit to the selection process by the managing teams. This is because the potential dangers of a delay in group A patients are usually grave compared to those associated with group C patients.

Since the majority of patients presenting to our hospital are not enrolled on the National Health Insurance Scheme (NHIS), they have to bear the cost of treatment out-of-pocket. This explains why lack of funds is a major reason for delaying surgical treatment in this study as many patients would need some time to source for funds required for their treatment. It was evident from our study that lack of funds was most frequent as a reason for treatment delay in the emergency (group A) patients and least in the elective (group C) cases. This trend was also observed with the presence of comorbidities as a reason for delay.

Our results show a disproportionate volume of pre-operative admissions during the weekdays as compared to weekends. Orosz *et al.*, had identified a similar disproportion of this nature in their review of the timing and delay in the operative treatment of hip fractures in the elderly in four New York hospitals.⁸ It follows therefore, that operation slots should be allocated in such a manner as to accommodate more cases during the week than what currently obtains. This should also take into cognizance the ratio of this disproportion. Moreover, in the light of the findings of the National Confidential Enquiry into Peri-Operative Deaths (NCEPOD) almost two decades ago, it is recommended that more slots should be made available for daytime surgeries in the emergency theatre during the working week.¹¹

Secondly, a third of all operated cases are modified Lankester group A patients who should be operated on within 6 hours of presenting to the hospital. This finding suggests that about one-third of all orthopaedic operating slots should be dedicated to acute emergency cases in our centre. This would reduce the delay interval for such cases.

Lack of theatre slot was the commonest reason for delaying operative treatment of our patients. This was particularly common in the group B (urgent) patients. It could be that our centre gives priority to the emergencies (group A) at the expense of urgent cases while very few elective cases (group C) get operated upon at all. Our study reveals both clinical and organizational reasons for delay in the operative treatment of patients. Theatre inefficiency has

been shown to be a major factor in the delay encountered in treating surgical patients especially in the developing countries.¹² In such circumstances, the solution lies in the improvement of efficiency of the operating theatre, alternatively, theatre time needs to be increased in order to accommodate all trauma and elective admissions in reasonable time. This buttresses the wisdom in the proposal by Villa and coworkers that the allocation of beds and operating theatre hours should be based on patient flow characteristics of the various units and specialties in the hospital.¹³ A follow-up study is needed to further elucidate the factors responsible for non-availability of theatre slots in our centre. That notwithstanding the contributory factors for the theatre non-availability will probably include wastage of operating time from cancellation of cases, delays encountered in transferring patients from the wards to the theatre, shortage of instrument sets occasioning the need to re-sterilize after every one or two operations, amongst others. Other important causes of treatment delays in our hospital are nonavailability of blood for surgeries as well as industrial actions by the various groups of hospital staff. It would be expected that these factors are likely to be encountered in similar practice settings in other parts of the developing world.

The factors that significantly determine delay to operative treatment included the day of admission (weekday or weekend) and the urgency of the patient's condition based on the modified Lankester grouping. The need for a careful review of our operation booking policy cannot be over-emphasized. The delay occasioned by poor ASA status has been described although it is not statistically significant in this study.¹⁴ Attempts are often made to optimise relatively poor operative risk patients before surgery and this may contribute to the delay. Orosz *et al.*, in their review of hip surgeries, also identified the need to optimize patients, the admission of patients on certain days of the week, as well as lack of theatre slots; as factors that may significantly contribute to delay before surgery.⁸

In interpreting the results of our findings, the following limitations were encountered. The modified Lankester classification of patients was done retrospectively, this could have denied the investigators in this study some details of the individual cases which might affect the accuracy of our classification. It is debatable that the mix of elective procedures classified as group C by Lankester *et al.*, have to be done within 5 days of presentation. Secondly, because hospital records are based on day/month/year dating, delay to surgery could only be measured in days as against hours; this reduces the precision of the estimates. The ASA classification, like most clinical classification systems, is known to have the disadvantage of being observer-dependent. Having been derived from clinical

notes, the ASA classes of our patients is another potential source of inaccuracy.

CONCLUSIONS

Patient characteristics associated with a delay included admission during the weekend and modified Lankester groups B and C. This audit shows that our current practice in terms of promptness to surgical care and communication falls short of the ideal. There is a need for better communication between surgeons and patients/relatives about delays in surgical treatment. Theatre facilities should be expanded and efficiency of service delivery improved. Attention to these relatively avoidable gaps will make our practice more patient-centred as well as improve patient satisfaction, safety and outcome. The extent to which delay affects functional recovery and the outcome of treatment requires further studies.

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