Original Article

Comparison Of Patient Vs Hospital-Related Factors Leading To Delay In Orthopedic Procedures In A Tertiary Care Unit Of Rawalpindi

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Abstract

Objective: To determine the frequency of delays in elective orthopedic surgeries and to identify patient-related and hospital-related factors contributing to these delays in a tertiary care hospital.

Methods: A total of 378 patients aged 18–60 years scheduled for elective orthopedic procedures were enrolled using non-probability consecutive sampling. Patients were categorized according to the Lankester classification into Groups A, B, and C based on recommended time frames for surgery. Any delay beyond the recommended period was documented. Causes of delay were classified as patient-related or hospital-related using predefined criteria. Data analysis was done with SPSS version 25.

Results: Out of 378 patients, 227 (60.1%) experienced a delay in their scheduled orthopedic procedure. Patient-related factors were the most common causes of delay, with medical co-morbidities accounting for 17.0% of cases, followed by financial constraints (11%) and patients who broke their NPO before surgery (6.87%). Hospital-related factors included lack of theatre time (14%), procedural lapses (7.14%), and electrical power or equipment failure (3.96%). We did not find any statistically significant association between delay of the procedure and gender, cause of injury, body part affected, or Lankester priority group ($p > 0.05$).

Conclusion: Delays in elective orthopedic surgeries were frequent and predominantly influenced by modifiable patient-related and system-related factors rather than demographic or clinical characteristics.

Keywords: Orthopedic Procedures, Elective Surgical Procedures, Time-to-Treatment, Tertiary Care Centers.

Introduction

According to contemporary estimates, around 313 million operations are performed annually worldwide, with just six of those surgeries occurring in the poorest nations. Surgery is considered an essential and indivisible component of health care.[1,2] One of the many healthcare sectors is orthopedic surgery. Elective orthopedic surgery is one of the specialties in which long waiting lists have become a well-known phenomenon.[3] Several factors contribute to the accumulation of patients on waiting lists. One of the major reasons is that orthopedic injuries and diseases resulting in surgery have increased dramatically in the past couple of decades.[4]

Orthopedic surgery delays and cancellations have been reported to be frequent and to have serious negative consequences, such as detrimental impacts on hospital operations and unfavorable patient outcomes.[2,5] When surgical treatments are canceled for whatever reason, the hospital's effectiveness is diminished, waiting times rise, patient care may be compromised, resources are squandered, and costs rise.[6] This causes a variety of issues for the patient since postponed or canceled surgery results in additional time spent in pain, limited mobility, and a lower quality of life. A postponed procedure puts the patient at greater risk for complications and ultimately reduces their chances of survival. Additionally, it poses a significant administrative logistical challenge to the healthcare systems. Improving services and early treatment are made easier by knowing the reasons behind treatment delays. Patients' discomfort and annoyance, hospital stays, and treatment expenses are all decreased when such reasons are mitigated.

Contributions:
OI SR- Conception, Design
OI - Acquisition, Analysis, Interpretation
OI - Drafting
OI - Critical Review

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.

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Data Availability Statement: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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A study found the reasons and consequences for the cancellation of orthopedic Surgeries. 552 (40.8%) of 1353 patients attending orthopedic surgery were cancelled. The most common reasons were attributable to the hospital (48.7%), mainly due to infrastructural breakdown (28.7%) and procedural lapses by hospital personnel (20.0%). 219 (37.8%) delays were attributable to the patients and were mainly due to financial constraints (25.6%), 4.1% due to patients having eaten, and 4.1% patients not procuring implants.[7]

The purpose of this study is to measure the causes of delay of surgeries in a tertiary care hospital. By identifying and addressing factors contributing to delays, hospitals can improve patient outcomes, such as reduced hospital stays and improved satisfaction. Minimizing delays will assist to minimize the threat of complications and adverse events.

Materials And Methods

This study was performed in the form of a descriptive cohort study in the Department of Orthopedic Surgery in a tertiary care hospital. The study period was six months from the date the research synopsis was formally approved by the hospital's ethical review committee. The end was to consider and compare patient-related factors and hospital-related factors that cause delays in orthopedic procedures.

The sample size was determined using the sample size calculator of the WHO, which is provided for a single population proportion. Keeping the level of significance equal to 5%, the expected proportion equal to 4.1%, and the margin of error equal to 2%, the size of the sample that will be collected was calculated and discovered to be 378 patients. A non-probability consecutive sampling technique was used for recruitment of the patients during the period of study.

All the patients, including males and females between 18 and 60 years who are going to undergo orthopedic procedures, were included in the study. Patients undergoing emergency surgeries and patients who are considered American Society of Anesthesiology (ASA) class III and IV were excluded to minimize the confounding from high anesthetic risk and emergency-related delays. After obtaining the permission of the institutional ethical review committee, eligible patients were included after fulfilling the inclusion and exclusion criteria. The information was obtained with the written consent of the patients/attendants. Demographic data and relevant clinical data, such as age, sex, body mass index, cause of injury, and body part affected, were noted in a predesigned proforma.

Patients were divided into three groups with respect to surgical intervention time frame as recommended by Lankester et al, [21.] Group A: included patients who had open fractures and dislocations, as well as those who were necessitated to undergo surgical intervention within 6 hours of entry. Group B consisted of the patients with hip fractures, long bone injuries, and ankle fractures that were expected to be operated on by the end of the day (as were the patients presented to the consultant in the trauma round). Group C consisted of those patients with tendon and simple hand fractures who were to be operated on within 5 days of presentation.

The patients were all prepared for surgery as per the usual protocols in the ward. Any delay from the recommended time frame was recorded. Cause for delay was either described as hospital or patient-related based on predefined operative definitions. Hospital-related factors such as infrastructural problems (failure or loss of electrical power) and lapses in procedure among the totality of the hospital personnel. Patient-related factors included being financially constrained, ingesting food or medication before surgery, and a lack of obtaining the needed implant.

The Statistical Package for Social Sciences (SPSS) version 25 was used to enter and analyze all the data that was gathered. While the qualitative data (gender, source of injury, afflicted body part, Lankester group, causes causing delay) were given as frequencies and percentages, the quantitative variables (age, weight, height, BMI) were presented as means and standard deviations. The delays between the various groups were compared using the chi-square test. Stratification was used to control potential impact modifiers, including age, gender, BMI, origin of injury, body part affected, and Lankester group. If the results of a post-stratification chi-square test were determined to be statistically significant, the p-value was deemed to be less than or equal to 0.05.

Results

Data collected were all entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Quantitative variables (age, weight, height, BMI) were presented as mean and standard deviation, while qualitative variables (gender, cause of injury, affected body part, Lankester group, factors leading to delay) were presented in the form of frequencies and percentages. The chi-square test was used to compare the delays between the different groups. Potential effect modifiers such as age, gender, BMI, cause of injury, body part affected, and Lankester group were controlled by stratification. A post-stratification chi-square test was conducted, and the p-value was analyzed to check if this test was less than or equal to 0.05.

Table 1: Description of Baseline Continuous Variables

	N	Minimum	Maximum	Mean	Std. Deviation
Age	378	18	75	45.54	17.010
Weight	378	50	100	76.09	14.587
Height	378	2	2	1.71	0.117
BMI	378	14	43	26.50	6.141

Table 01 summarizes the baseline demographic and anthropometric characteristics of the study participants. The age of the patients included-the mean age of the total 378 patients was 45.54±17.01 years, with ages ranging from 18 to 60 years, so that young and old subjects undergoing orthopedic procedures were included. Gender was numerically coded and had a near-equal balance of males to females with a mean value of 1.54 (%) ±0.49. Mean body weight of the concerned participants was 76.09 ± 14.59 kg, with a range from 50 to 100 kg. The mean height was 1.71 ± 0.12 m, and there was relatively little variation in the study population. The average body mass index (BMI) was 26.50 ± 6.14 kg/m², with a range of 14 to 43 kg/m², suggesting there was a fair proportion of patients included in the overweight category, and were represented along the underweight to obese range.

Table 2: Description of Baseline Categorical Characteristics

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	174	46.0
	Female	204	54.0
Cause of Injury	Assault	72	19.0
	Road Traffic Accident	67	17.7
	Fall	76	20.1
	Sports Injury	90	23.8
	Other	73	19.3
Body Part Affected	Spine	65	17.2
	Left Leg	59	15.6
	Right Leg	57	15.1
	Right Arm	71	18.8
	Left Arm	55	14.6
	Pelvis	71	18.8
Lankester Group	Group A	126	33.3
	Group B	130	34.4
	Group C	122	32.3

Table 2 indicates the baseline categorical characteristics of the study population. With regards to the distribution of gender, females were a little bit more than males (54.0% versus 46.0%). The causes of injury were heterogeneous, and the most common cause was from sports-related injuries (23.8%), falls (20.1%), and assault-related injuries (19.0%). Road traffic accidents were 17.7%, other causes of injury 19.3%; thus, a wide range of injury mechanisms is represented by the patients in need of orthopedics.

Table 3: Procedure Delay (Overall)

			Frequency	Percent
Procedure Delay	Yes		227	60.1
	No		151	39.9
Factors Leading to Delay	Hospital Related	Lack of theatre time	53	14.0
		Procedural lapses (inadequate paramedic staff, non-availability of an anesthetist)	27	7.14
		Electrical power failure/ Equipment failure	15	3.96
	Patient Related	Medical co-morbid	64	17.0
		Financial constrain	42	11.0
		Broken NPO	26	6.87

About the anatomical site, the right arm and the pelvis of the body were the most involved body parts, which occurred in 18.8% and 18.8% of the cases, respectively. Spine involvement has been reported 17.2% of patients, and injuries to the left leg (15.6%), right leg (15.1%), and left arm (14.6%) were so frequently related. Patients were almost equally

distributed among the surgical priorities of Lankester classification, in which 33.3% were classified as group A, 34.4% were Group B, and 32.3% were Group C, showing balanced distribution between surgical urgency categories in the study cohort.

Table 3 indicates that a large volume of patients have experienced a delay in their prearranged orthopedic procedure. 227 patients (60.1%) reported that they experienced a delay in their orthopedic procedure, and 151 patients (39.9%) underwent surgery on schedule. Among the causes relating to the hospital, lack of sufficient time for theatre was a more common cause (14.0%) compared to procedural lapses (7.14%) and electrical/ equipment failure (3.96%). Patient-related issues contributed significantly to delays, where medical co-morbidities were the most frequent reason (17.0%). Delays caused by patients ingesting food before surgery were found in 6.87% of cases, suggesting the important position of modifiable patient-related factors.

Table 4: Association of Demographic and Clinical Variables with Procedure Delay (n = 378)

Variable	Category	Procedure Delay		Total	P-value
		Yes	No		
Gender	Male	103 (45.4%)	71 (47.0%)	174 (46.0%)	0.753
	Female	124 (54.6%)	80 (53.0%)	204 (54.0%)	
Cause of Injury	Assault	41 (18.1%)	31 (20.5%)	72 (19.0%)	0.591
	Road Traffic Accident	38 (16.7%)	29 (19.2%)	67 (17.7%)	
	Sports Injury	47 (20.7%)	29 (19.2%)	76 (20.1%)	
	Fall	60 (26.4%)	30 (19.9%)	90 (23.8%)	
	Other	41 (18.1%)	32 (21.2%)	73 (19.3%)	
Body Part Affected	Spine	42 (18.5%)	23 (15.2%)	65 (17.2%)	0.175
	Left Leg	30 (13.2%)	29 (19.2%)	59 (15.6%)	
	Right Leg	33 (14.5%)	24 (15.9%)	57 (15.1%)	
	Right Arm	49 (21.6%)	22 (14.6%)	71 (18.8%)	
	Left Arm	36 (15.9%)	19 (12.6%)	55 (14.6%)	
	Pelvis	37 (16.3%)	34 (22.5%)	71 (18.8%)	
Lankester Group	Group A	74 (32.6%)	52 (34.4%)	126 (33.3%)	0.907
	Group B	78 (34.4%)	52 (34.4%)	130 (34.4%)	
	Group C	75 (33.0%)	47 (31.1%)	122 (32.3%)	
Total	–	227 (100%)	151 (100%)	378 (100%)	

Table 4 displays an association between delay to procedure and some selected demographic and clinical variables. There was no statistically significant relationship between the delay in doing the procedure and gender ($p = 0.753$) or cause of injury ($p = 0.591$). Similarly, there was no significant association between the body part affected and the occurrence of delay ($p = 0.175$). The distribution of delays between Lankester surgical priority grouping was also found to be similar, and there was no significant difference ($p = 0.907$), so that delays to procedures were not significantly affected by these variables in the study population.

Discussion

The current study has revealed elective orthopedics delays to be very common and involving more than 50% of elective patients scheduled. This finding shows the existence of a very important deficiency between demand for surgery and capacity of the health systems, especially in tertiary care hospitals situated in resource-constrained settings. Similar delay rates have been reported throughout lower- and middle-income countries (LMICs), where systemic inefficiencies and socioeconomic barriers are often involved in the equation and which compromise timely delivery of surgical care.[8,9]

Patient-related factors, most significantly, financial limitations, were the leading cause of the delay in surgery in this study. This observation is in line with previous evidence provided by Mengistie CT et al. that both out-of-pocket expenditure and limited access to health insurance are significant barriers to access to surgical services in developing countries.[10,11] Rathore AH et al. found during their study that the inability to meet the cost of implants or perioperative expense has been repeatedly documented as a preponderant factor in delaying orthopedic interventions, raising speculation that the economic vulnerability directly correlates with less-than-ideal surgical outcomes.[12]

Hospital-related causes like procedural lapses and failure of electrical power also contributed to a significant percentage of delays. Comparable results have previously been recorded in previous studies that describe the inefficiencies of the operating rooms, operator-related errors, as well as infrastructural inadequacies as key determinants of delay during surgeries.[13,14] Akpanudo E et al. stated that, in particular, the issue of unreliable power supply persists as a problem in many healthcare facilities in LMICs, often resulting in disruption of the operating room schedule and consequent loss of surgical time.[15] These recurring institutional barriers suggest the need for system-level change as opposed to isolated corrective measures.

The absence of a significant relationship between the delay of a procedure and demographic factors such as gender is consistent with prior work that suggests that surgical delays are due mostly to organizational and economic factors and not patient demographics.[16] Similarly, no statistically significant association with delay and cause of injury or affected body part was found. This contrasts with findings from high-income countries, as found by Nagengast ES et al., where the severity of injury and anatomic location often determine surgical prioritization, because of an established trauma pathway and resource availability.[17]

Notably, the fact that there was little variation between Lankester priority groups implies that even patients needing urgent intervention were not always getting operated on in recommended time frames. This finding is in discord with studies performed in well-resourced health systems, where protocols for the prioritization of surgeries have been shown to effectively reduce the use of time-to-surgery for high-risk cases in orthopedic surgery, as stated by Warren M et al.[18] The discrepancy shows the limited relevance of prioritization frameworks in settings where infrastructural and financial limitations outweigh clinical urgency.

The high overall rate of delay of elective orthopedic procedures reported in this study is consistent with other published reports that document cancellation or delay of elective orthopedic procedures ranging from 40% to 65%.[5] Importantly, the delay in surgery has been associated with increased duration of hospital stay, increased perioperative complications, and a poorer functional recovery, particularly in fracture management.[19,20] Such are the downstream consequences of highlighting the clinical and economic importance of tackling surgical delays.

Collectively, the findings of this study support the results of studies in the existing literature that reveal orthopedic surgical delays to be largely preventable and primarily due to modifiable patient-level and system-level factors. Evidence from the interventional studies suggests that improvement in preoperative evaluation, financial support mechanisms, operating room logistics, and reliability of infrastructure may decrease delay rates significantly. Addressing these determinants is critical to the efficiency of surgery and to improving patient outcomes and quality of orthopedic care in a tertiary healthcare setting.

Conclusions

This research concludes that the delay of elective orthopedic procedures is very common in the tertiary care hospital environment, as more than 50% of the surgeries that were scheduled are conducted beyond the recommended time frame. Patient-related factors and especially medical co-morbidities and financial constraints were the major reasons for delaying surgery, and secondly, hospital-related factors like lack of theatre time, procedural lapses, and infrastructural limitations. No significant relationship was found between delay period and demographic characteristics, cause of injury, body part involved, or Lankester priority group, suggesting that delays were relatively independent of clinical urgency and patient profile. These findings embrace the necessity for specific health system interventions geared towards supporting financial aid mechanisms, operational efficiency, and infrastructural strengthening to reduce preventable delays in surgery, as well as to enhance the overall quality of orthopaedic care.

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