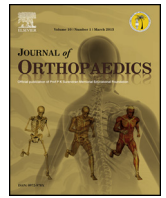




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Original Article

Unplanned 90-day readmissions in a specialty orthopaedic unit—A prospective analysis of consecutive 12729 admissions



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ABSTRACT

Introduction: Unplanned readmissions are an undesirable and expensive outcome of clinical practice. Previous reported literature is limited by retrospective study designs and 30 day study intervals. We analyzed causes for 90-day unplanned readmission, temporal occurrence of major causes, possible predisposing factors, bed days lost and economic impact.

Materials & methods: A prospective analysis of 12729 admissions was performed over 1 year in an Orthopaedic unit. Consecutive readmissions for unplanned circumstances within 90-days of discharge following the index procedure were included. Open injuries, polytrauma, primary osseous infections and planned readmissions were excluded.

Results: We noted an overall readmission rate of 2.07% and subspecialty rate of 1.43%, 3.32%, 2.9% in trauma, spine and total joint arthroplasty (TJA) respectively. The leading cause was wound complications accounting for 49.62%, followed by medical causes (trauma –18.37%; TJA –27.5%) and aseptic pain (spine-31.6%). Though 87.1% of superficial surgical site infections (SSIs) occurred within 30 days, 21.1%, 41.2% and 60% of the deep SSIs in spine, trauma and TJA respectively occurred beyond 30 days. The financial burden amounted to INR 1,01,55,770 and mean bed days lost was 7.6 per readmission. Age ≥ 70 years, indoor-stay ≥ 10 days, health insurance and co-morbid illnesses were associated with readmissions ($p < 0.05$).

Conclusions: Our study showed that limiting analysis to 30 day unplanned readmissions would lead to failure in identification of 34.85% of readmissions especially deep surgical site infections in TJA and trauma.

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1. Introduction

Unplanned readmissions are an expensive and undesired outcome for the patient, the treating physician and the health care system. Several studies noted that within 30 days of discharge, as many as one in four patients will return to the hospital^{1,2} and estimated costs for unplanned readmissions in Medicare spending were over \$17.6 billion in 2004.^{1,3} Reported 30-day readmission rates in Orthopedics have ranged from 2 to 14%.^{4,5} The most frequently reported factors relating to hospital readmissions were infection, unstable respiratory illness, development of a new problem, and male sex.^{6,7,8} Readmissions are an important factor in evaluating the cost-effectiveness of surgical procedures, and establishing a system to reduce risk of readmission can help to

successfully reduce costs for the healthcare system.^{9,10} Several studies^{2,11} have suggested that better inpatient care is associated with a lower risk of readmission and they are now being considered to be an indicator of health care quality.

Most studies on Orthopaedic readmissions are limited to a specific procedure/diagnosis.^{4,12–16} Analysis is frequently based on 30 day readmissions, and there is little data available for 90 day readmission rates.^{9,17} Reports on economic impact analysis are rare and focus on Medicare based spending, without giving a perspective on out of pocket expenditures.¹² This out of pocket expenditure is common in developing countries, where health care insurance coverage is negligible and can prove to be a substantial financial burden to the patient.^{18,19} Additionally, to the best of our knowledge, there are no studies analyzing readmissions and its economic impact in developing countries. With this as a background, we performed an analysis of 90 day unplanned readmissions in an Orthopaedic specialty unit consisting of all subspecialties without restriction on the type of surgical procedure

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performed. We analyzed (1) causes for 90-day unplanned readmission (2) temporal occurrence of major causes of readmissions (3) bed days lost and economic impact of readmissions (4) analysis of possible predisposing factors.

2. Materials and methods

A prospective consecutive analysis (cohort study) of patients readmitted in an Orthopaedic specialty hospital in India, from 1 st January 2015 to 1 st January 2016 was performed. The study was approved by the Institutional Review Board and informed consent was obtained from all readmitted patients. All readmissions for unplanned outcomes within 90 days of discharge following the index procedure were included. We excluded readmissions for planned staged procedures, open injuries, polytrauma and patients admitted with primary osseous infections (without previous surgical procedure). The readmissions were identified on a daily basis by an Orthopaedic surgeon (first author) in each of the subspecialties of Trauma, Spine, Total Joint Arthroplasty (TJA), Paediatric Orthopaedics and Arthroscopy from the hospital admission register. Readmissions were evaluated for causes under the categories of- wound infections, medical complications, persistence of pain, implant related and surgical complications. We evaluated the total bed days lost due to unplanned readmissions and the resulting economic impact. Length of in-hospital stay was obtained for each readmission, the sum total of which was used to calculate Total bed days lost. The economic impact was assessed using the direct expenses incurred by the patient during the period of readmission, which was obtained from the hospital bills. This was inclusive of room charges, surgeon fees, nursing charges and surgical procedure costs of the readmission alone. The analysis however did not include indirect expenses arising out of readmissions such as loss of productivity and employment. We analyzed timing of readmissions comparing 30 day versus 60 day and 90 day occurrence of readmissions. We attempted to identify probable predisposing factors for unplanned

Table 1

Causes of readmission for the Orthopaedic unit.

CAUSES	No. Of Readmissions
Wound Related	131
Medical causes	47
Aseptic pain	31 (spine 30)
Implant related	11
Repeat trauma	10
Physiotherapy	8
Fracture related (delayed union/loss of reduction)	6
Deterioration/recurrence of neurodeficit in spine	3
Reactive Synovitis	2
Miscellaneous	15

readmissions using Health Object™ extraction software (Manufacturer: Idea objects, Chennai, India).

Statistical analysis of probable risk factors was performed. Categorical variables were expressed as percentages or total numbers. Statistical analysis of categorical variables was done via the chi square test. Statistical significance was considered if *p*-value was less than 0.05 (confidence interval 95%).

3. Results

3.1. Rates and causes of 90 day readmissions

A total of 12,729 consecutive admissions were prospectively analyzed. We noted 264 (2.07%) unplanned 90- day readmissions in 251 patients (5 patients had multiple readmissions). The leading causes of readmissions were wound related causes (N = 131) with equal distribution between superficial surgical site infections (SSIs) (N=62) and deep SSIs (N=63). The second most common cause was medical causes (N=47) and this was followed by readmission for aseptic pain (N=31) (Table 1).

Table 2

Distribution of readmissions under major subspecialties.

Subspecialty	Causes	No. and percentages of readmissions	Percentage of total admissions	
Trauma (N = 6830, Readmissions = 98)	Wound Related	57 (SSI Superficial 21 + Deep SSI 34 + Surgical site hematoma 2)	58.16%	0.83%
	Medical causes	18	18.37%	0.26%
	Implant related	7	7.14%	0.1%
	Repeat trauma	5	5.1%	0.07%
	Fracture related complications	5	5.1%	0.07%
	Physiotherapy	2	2.04%	.029%
	Pain management	1	1.02%	.015%
	Miscellaneous	3	3.06%	.044%
Arthroplasty (N = 1757, Readmissions = 51)	Wound related	20 (SSI Superficial 13 + deep SSI 5 + hematoma 2)	39.22%	1.14%
	Medical	14	27.45%	0.79%
	Physiotherapy	6	11.76%	0.34%
	Trauma	5	9.8%	0.28%
	Reactive synovitis	2	3.92%	0.11%
	Fracture related complication	1	1.96%	0.05%
	Miscellaneous	3	5.88%	0.17%
Spine (N = 2860, Readmissions = 95)	Wound Related	42 (SSI Superficial 23 + Deep 11 + organ space 8)	44.21%	1.47%
	Aseptic pain	30 (10 for recurrent disc)	31.58%	1.05%
	Medical	13	13.68%	0.45%
	Implant related	4	4.21%	0.14%
	Recurrence/worsening of neurodeficit	3	3.16%	0.1%
	Miscellaneous	3	3.16%	0.1%

Note: SSI surgical site infection.

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