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Assessing the Delays in Patients Undergoing Orthopedic Surgery and the Associated Factors at Taleghani Hospital

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Abstract

Background: Transferring the patient to the operating room (OR) and back to the ward should be performed in the shortest time possible.
Objectives: We aimed to identify and classify different delays at our center and the possible factors associated with them.
Methods: We investigated 46 patients scheduled for elective orthopedic surgery at Taleghani Hospital, Tehran, from July 2017 to March 2018.
Results: Studying the time points showed that the main gap times included: T1 (when the surgical team informed OR staff until the orthopedic ward staff was informed (median of 5 minutes), T2 (when the orthopedic ward staff was informed until the patient was transferred to OR), T3 (when the patient reached OR until the patient was laid on OR bed), T6 (when the patient was prepared until the surgery started), T8 (from the end of the procedure until the patient exited the OR and entered the recovery room), T9 (duration spent in the recovery room), each with a median of 10 minutes. Although T5 and T6 were shorter in women (P = 0.005 and 0.020, respectively), the type of surgery or anesthesia did not affect the gaps.
Conclusions: This study showed a total of 75 minutes gap (delays in informing the ward and the time to transfer the patient to the ward), regardless of the duration of anesthesia, surgery, and preparations, which calls for the attention of the hospital's policymakers to design strategies for reducing these gaps.

Keywords: Time, Operating Rooms, Delay, Tehran

1. Background

Operating room (OR) is an important hospital unit, and appropriate scheduling to start each step on-time can increase OR's utilization, patients' flow, and satisfaction (1). Pre- and intra-operative delays are important, especially in emergency orthopedic procedures (2). However, the causes of perioperative delays, its impact on patient care and resource utilization, and solutions to reduce it are not well-defined (3).

2. Objectives

We aimed to identify and classify different delays at our center and the possible factors associated with them.

3. Methods

In this prospective cross-sectional study, 46 adult patients, aged > 18 years, scheduled for elective orthopedic surgery at Taleghani Hospital, Tehran, Iran, were included in the study from July 2017 to March 2018, after obtaining their written informed consent. An observer recorded patients' age, sex, type of anesthesia, method of transferring the patient to OR, the person who performed each step, and the following periods (transferring the patient to OR and reverse): T1) when the surgical team informed OR staff until the orthopedic ward staff was informed, T2) when the orthopedic ward staff was informed until the patient was transferred to OR, T3) when the patient reached OR until the patient was laid on OR table, T4) duration of anesthesia, T5) duration of patient's preparation for a surgical procedure, T6) when the patient was prepared until the surgery started, T7) duration of surgery, T8) from the end of the procedure until the patient exited the OR and entered the re-

covery room, T9) duration spent in the recovery room until the patient was transferred to the orthopedic ward.

Categorical variables were described by frequency and compared between the groups by chi-square test; numeric variables were described by mean ± standard deviation (SD) and compared using independent samples *t*-test or Mann-Whitney U test, based on normality of data distribution. All statistical analyses were performed using IBM SPSS Statistics for Windows version 21.0 (IBM Corp. 2012. Armonk, NY: IBM Corp.). The significance value was considered < 0.05.

4. Results and Discussion

The mean patients' age was 44.6 ± 18.9 years, and 65.2% were male. Median T1 was 5 minutes, and mean T2 and T3 were 12.4 ± 8.0 and 9.7 ± 6.4 minutes, respectively. The most common types of transferring the patient to the OR included stretcher and wheelchair (69.6 and 17.4%, respectively). Although none the durations were different based on the type of transferring (Table 1) in our study, we suggest that one person for patients' transfer (4) and or training the personnel can reduce this delay (5, 6) (Their awareness of time wastage and their greater coordination to reduce time loss). The hospital's authorities also play a pivotal role in these durations (to regulate coordination between OR and ward and also to resolve the environmental barriers to decrease this delay, design an elevator to decrease delay. (In our hospital, there is no elevator for patients' transfer to the OR, which can time wastage).

Two other delays before surgery were T5 and T6 (with mean of 15.65 ± 6.29 and 10.37 ± 3.89 minutes, respectively). Wright and colleagues also indicated the most common reasons for delay as unavailability of surgeon and anesthesiologist and unpreparedness of patients (7). This duration can increase patients' stress and anxiety (8), surgical complications (9), occupy the OR bed, and impair patients' flow. The shorter mean T5 and T6 in women of this study also showed the role of patient factors (BMI' age') on the delays. (increase BMI and age can cause time wastage).

After the patient was laid on the OR table, we measured 5 other durations. Mean T4 and T7 were 13.18 ± 5.70 and 68.76 ± 34.17 minutes, respectively, not only different according to the type of the procedure ($P = 0.017$ and 0.049) but also according to the anesthetic supervisor ($P = 0.007$ and 0.048) and assistant ($P = 0.025$ and 0.001), respectively; however, none of the intervals were different based on the type of anesthesia ($P > 0.05$; Table 1). These durations may depend on several inevitable factors, such as the severity and type of disease, type of surgery, and intra-operative complications. However, there are controllable factors that may prolong the surgical duration and increase the surgeon's workload (10). In our study, the longer duration of anesthesia could be due to the fact that in our training hospital, the anesthesiologist has to spend extra time training the assistant students. Also, the unpreparedness of the patient sent from the ward was another factor for these delays. Another important duration investigated in the present study was T6, commonly neglected, which delays could be prevented by the timely presence of the surgeon, cooperation, and teamwork of the OR staff. Therefore, OR scheduling is required to ensure timely performance of surgery (11, 12).

The two final durations investigated in the present study included T8 and T9 (with a mean of 11.85 ± 5.20 and 13.37 ± 4.95 minutes, respectively), indicating that the surgical team should inform the anesthetic team about the exact time of ending the procedure so that the anesthetic team can punctually awaken the patients in the recovery room. However, we did not find a similar study to compare the results. T9 depends on staff coordination, and the reasons for this delay were similar to that of T2 in our study. The limitations of our study included recording the time points by one observer recorded the time periods, which decreases between-observer bias, but has the chance of inter-observer bias. In addition, it was difficult to determine the person who transferred the patient or was in charge of different steps.

In conclusion, the results of this study showed that not only perioperative delays, duration of operation and anesthesia but also delays in informing the ward and the time to transfer the patient to the ward and back to the ward are important, resulting in a total delay of about 75 minutes, regardless of the duration of operation and anesthesia. Therefore, it is essential that the hospital policymakers take action to reduce these delays to improve OR efficiency, patient flow, and therefore, we can predict that causes increase patients' satisfaction, and reduce the staff's workload.

Footnotes

Authors' Contribution: Reza Zandi designed the study. Adel Ebrahimpour, Mohammad Ali Okhovatpour, and Amirjafar Adibi collected and analyzed the data. Mohammad Reza Minator Sajadi supervised the study.

Conflict of Interests: The authors have no conflict of interest.

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Table 1. Comparison of the Durations Between the Study Variables in the Studied Population[a,b]

	T1	T2	T3	T4	T5	T6	T7	T8	T9
Gender									
Male	4.57 ± 6.027	13.77 ± 8.756	10.00 ± 5.872	14.50 ± 6.048	17.50 ± 6.124	11.33 ± 4.138	74.67 ± 31.97	12.17 ± 4.292	13.00 ± 3.620
Female	4.81 ± 7.56	9.87 ± 6.076	9.37 ± 7.719	11.15 ± 4.634	12.19 ± 5.154	8.56 ± 2.658	57.69 ± 36.43	11.25 ± 6.708	14.06 ± 6.884
P value[c]	0.90	0.121	0.760	0.100	0.005	0.020	0.109	0.575	0.494
Type of transferring the patient									
Stretcher	4.69 ± 6.08	11.41 ± 5.988	9.53 ± 5.730	13.33 ± 6.370	15.78 ± 6.364	10.22 ± 3.757	65.72 ± 33.69	11.72 ± 5.329	13.44 ± 4.655
Wheelchair	6.75 ± 9.58	18.88 ± 13.74	12.50 ± 10.00	11.25 ± 4.787	15.63 ± 4.955	12.50 ± 4.629	88.75 ± 26.15	13.75 ± 3.536	13.75 ± 4.432
Standing	5.00	15.00	15.00	15.00	25.00	10.00	60.00	10.00	15.00
P value[d]	0.507	0.060	0.291	0.902	0.385	0.234	0.322	0.619	0.915
Type of anesthesia									
Mask	2.50 ± 3.536	12.50 ± 3.536	7.50 ± 3.536	5.00	17.50 ± 3.536	15.00 ± 7.071	80.00 ± 84.853	10.00 ± 7.071	12.50 ± 3.536
General	3.44 ± 3.521	10.62 ± 6.551	7.81 ± 4.460	14.55 ± 5.681	14.69 ± 6.183	10.75 ± 4.509	72.38 ± 29.691	12.19 ± 4.070	12.50 ± 3.651
Local	6.67 ± 7.638	10.00 ± 5.000	11.67 ± 5.774	15.00	16.67 ± 10.408	11.67 ± 7.638	53.33 ± 40.415	8.33 ± 2.887	11.67 ± 2.887
Spinal	7.06 ± 8.855	14.89 ± 9.923	12.50 ± 8.269	13.00 ± 6.211	17.22 ± 5.996	9.72 ± 2.081	70.28 ± 32.920	12.78 ± 5.483	15.28 ± 5.278
P value[d]	0.224	0.589	0.177	0.580	0.553	0.371	0.840	0.645	0.332

[a] Values are expressed as mean ± SD.
[b] The significance level was considered < 0.05 in all tests.
[c] The results of independent samples *t*-test,
[d] The results of ANOVA test.

Informed Consent: In this prospective cross-sectional study, 46 adult patients, aged > 18 years, scheduled for elective orthopedic surgery at Taleghani Hospital, Tehran, Iran, were included in the study from July 2017 to March 2018, after obtaining their consent.

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