Reduction of length of hospital stay in patients undergoing major planned orthopedic surgery after the implementation of the Patient Blood Management (PBM) in Italy

Marco Scardino[1], Dario Tanzi[1], Neige Morin[2], Montse Roset[3], Eleonora Zonta[3], Núria Lara[3], Antonio Ramirez de Arellano[2]
[1] Humanitas Research Hospital (Milano); [2] CSL Vifor; [3] IQVIA

INTRODUCTION

Patient Blood Management (PBM)'s essential principle is the use of all suitable measures to protect and manage a patient's own blood, in a way that is personalized to individual patient's needs to improve his outcomes (1, 2, 3). There is an urgent need to integrate PBM strategies into routine care for patients undergoing surgeries, in order to improve the quality of care and reduce the healthcare costs (4).

The objective of the current study was to compare the length of hospital stay (LOHS) before vs. after the implementation of PBM in Humanitas Research Hospital of Milano, Italy.

METHODS

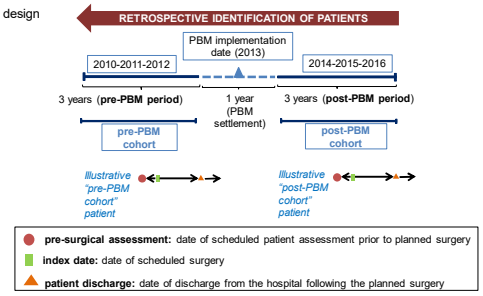
STUDY DESIGN. This is an observational retrospective study among adult patients who underwent major planned orthopedic surgeries (hip or knee replacement) in Humanitas Research Hospital of Milano, Italy.

STUDY POPULATION. Two separate cohorts:

- pre-PBM cohort: orthopedic surgeries performed during the 3 years period before PBM program use (2010 to 2012)
- post-PBM cohort: orthopedic surgeries performed during the 3 years period after PBM implementation (2014 to 2016)

STUDY COLLECTION PERIODS. The date of the patient surgery was referred to as **index date**. The data collection period spanned two main stages anchored to the date of index event: the **pre-surgical assessment period** (date of assessment up to three months before the surgery); and the **post-index event period**, starting one day after the index date and ending 30 days after patients being discharged from the hospital or death, whichever occurred first (Figure 1).

Figure 1. Study design

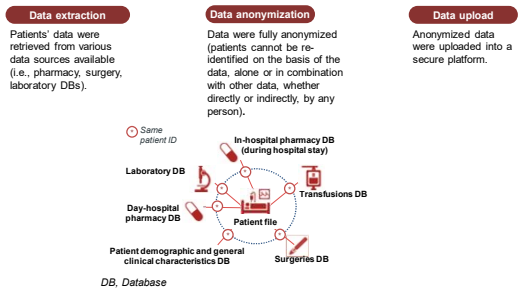


PBM, Patient Blood Management

THE VARIABLES. For all surgeries included in the study, patient's demographics, surgery details, iron deficiency anemia, treatments received, Red Blood Cells (RBC) transfusions, LOHS and other clinical outcomes were collected. Transfusion policy applied by the hospital was also collected.

DATA SOURCE. The collection approach consisted of retrieving data of patients who underwent surgery before or after the PBM program implementation from hospital Databases (DB) (Figure 2). Data collected were fully anonymized at hospital-level and uploaded into a platform.

Figure 2. Data collection and management process



DB, Database

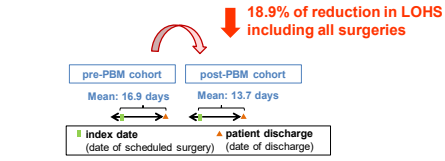
DATA ANALYSIS. Descriptive analysis of demographic and clinical characteristics of surgeries performed in both study cohorts was performed. LOHS was compared between study cohorts using the Student t test.

RESULTS

PBM implementation and impact on the LOHS

- 13% of post-PBM patients used ferric carboxymaltose (FCM) before the surgery.
- In pre-PBM cohort, patients were hospitalized for a mean (standard deviation, SD) of 16.9 (2.9) days, duration reduced to 13.7 (3.6) days in the post-PBM cohort (p<0.0001) (Figure 3).

Figure 3. Number of days between date of surgery and date of hospital discharge

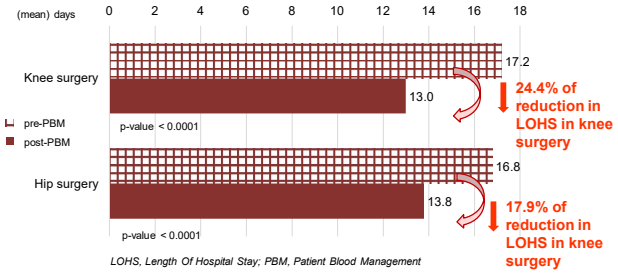


	pre-PBM (N=3,267)	post-PBM (N=4,705)	p-value
Days between date of surgery and date of discharge [mean (SD)]	16.9 (2.9)	13.7 (3.6)	<0.0001

LOHS, Length Of Hospital Stay; PBM, Patient Blood Management; SD, Standard Deviation

- When analyzing by type of surgery, pre-PBM patients were discharged after 17.2 (3.4) or 16.8 (2.7) days for knee and hip replacement, respectively. While for post-PBM cohort, time of discharge decreased to 13.0 (3.8) and 13.8 (3.5) days (p<0.0001) (Figure 4), respectively.

Figure 4. Days (mean) between date of surgery and date of hospital discharge, by type of surgery



LOHS, Length Of Hospital Stay; PBM, Patient Blood Management

Hospital characteristics. After PBM implementation in 2013, the site implemented a restrictive transfusion policy (i.e., when Hemoglobin concentration was <7 g/dL to 8 g/dL).

Patient demographics.

- Data from 7,972 orthopedic surgeries were included in the study (3,267 surgeries included in the pre-PBM cohort and 4,075 in the post-PBM).
- Out of the 7,972 procedures, 6,438 and 1,534 were hip and knee replacement surgeries, respectively.
- Surgeries were more frequently associated with female patients, 56.8% (59.0% in pre-PBM cohort and 55.2% in post-PBM cohort). The percentage of female patients was slightly higher in the subset of patients receiving knee replacement (73.5%) compared to hip replacement (52.8%)
- Patients had a mean (SD) of 64.1 (12.3) years of age at time of surgery.

Surgery characteristics

- Mean (SD) time surgery duration was 1.1 (0.5) and 1.2 (0.5) hours in pre- and post-PBM cohorts, respectively.
- In terms of bleeding, pre-PBM cohort patients lost a mean (SD) of 176.5 (69.8) mL of blood during the surgery and post-PBM patients 207.2 (78.5) mL. In most cases, spinal anesthesia was used (overall, 99.1%, n=7,897) (Table 1).

Table 1. Surgery characteristics

	pre-PBM (N=3,267)	post-PBM (N=4,705)
Mean (SD) time of surgery (hours)	1.1 (0.5)	1.2 (0.5)
Mean (SD) blood loss volume (mL)	176.5 (69.8)	207.2 (78.5)
Use of spinal anesthesia	3,237 (99.1%)	4,660 (99.0%)

PBM, Patient Blood Management; SD, Standard Deviation

CONCLUSIONS

The present study showed a significant impact of PBM on the reduction of LOHS following major orthopedic surgery, proving how this multidisciplinary approach represents a reliable option to reduce healthcare resource use and increase efficiency of health care system.

REFERENCES.
(1) Shander A, et al. A Global Definition of Patient Blood Management. Anesth Analg. 2022 Sep 1;135(3):476-488. doi: 10.1213/ANE.0000000000005873.
(2) Franchini M, et al. Patient Blood Management: a revolutionary approach to transfusion medicine. Blood Transfus 2019; 17: 191-5. doi: 10.2450/2019.0109-19.
(3) Bolcato M, et al. Patient blood management: The best approach to transfusion medicine risk management. Transfus Apher Sci; 2020 Aug;59(4):102779. doi: 10.1016/j.transci.2020.102779.
(4) Hofmann A, et al. Economic considerations on transfusion medicine and patient blood management. Best Pract Res Clin Anaesthesiol; 2013 Mar;27(1):59-68. doi: 10.1016/j.bpa.2013.02.001.

DISCLOSURES. This study was supported by Vifor (International) AG, a CSL Vifor Company. ARA and NM are full time employees of CSL Vifor. IQVIA, employer of MR, EZ and NL, received consulting fees from Vifor (International) AG.

ACKNOWLEDGEMENTS. Medical writing support was provided by IQVIA and was funded by Vifor (International) AG.