

# Hospital *Patient Blood Management* (PBM) standards in major elective orthopedic surgery: A cross-sectional study in a large cohort of hospitals in Spain

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XLII Jornadas de Economía de la Salud  
Girona, 6 de julio de 2023



# Introduction

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**Red blood cell (RBC) transfusions are frequently overused to treat patients with anaemia or bleeding<sup>1</sup>**

***Do not Do* initiatives like Choosing Wisely, Compromiso por la Calidad de las Sociedades Científicas and Essencial recommend<sup>2-4</sup>**

- Do not proceed with potentially bleeding elective surgery without properly diagnosing and treating preoperative anemia
- Avoid transfusion when antifibrinolytic drugs are available to minimize surgical bleeding
- Avoid transfusion in hemodynamically stable patients with Hb 8 g/dl
- Avoid transfusing a higher number of RBC units than required

**The triad of anaemia, blood loss and transfusion are associated with increased risk of patient harm and healthcare costs<sup>5-6</sup>**

1. Anthes E. Nature 2015; 2. Compromiso por la calidad de las Sociedades Científicas [https://www.mscbs.gob.es/organizacion/sns/planCalidadSNS/cal\\_sccc.htm](https://www.mscbs.gob.es/organizacion/sns/planCalidadSNS/cal_sccc.htm); 3. Choosing Wisely <http://www.choosingwisely.org/societies/society-for-the-advancement-of-blood-management/>; 4. Essencial [http://essencial.salut.gencat.cat/es/detalls/Article/anemia\\_preoperatoria](http://essencial.salut.gencat.cat/es/detalls/Article/anemia_preoperatoria); 5. Farmer et al. Best Pract Res Clin Anaesthesiol, 2013; 12. Spahn DR. Anesthesiology 2010

# Introduction

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**Patient blood management (PBM) is an evidence-based bundle of interventions to minimize unnecessary blood transfusions and improve patient safety<sup>6</sup>**

- Widely referenced in clinical guidelines<sup>7-9</sup>
- Several institutions, such as WHO and EU among others, recommend healthcare organizations to implement hospital-wide PBM programs<sup>10-11</sup>

**In elective orthopaedic surgery, hospitals set out PBM clinical pathways that run along the pre, intra and postoperative stages**

**Studies on the actual use of PBM strategies across healthcare organizations are limited to few hospitals and geographies, and the current standard of care in Spain is unknown**

# Objective

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**This study aims to describe to what extent PBM standards are consolidated in clinical practice and its variation among hospitals in Spain, in patients undergoing major elective orthopedic surgery**

- Primary elective knee arthroplasty replacement (TKA)
- Primary elective hip arthroplasty replacement (THA)

# Methodology

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**All primary elective knee (TKA) or hip (THA) replacement surgeries performed at 42 hospitals in Spain from January 2018 through December 2019**

- Selection ICD-9/10 procedure codes
- Data sources: CMBD, surgery, laboratory, hospital pharmacy and transfusion

**Study data was based on the MAPBM hospital network database, an initiative that aims to support healthcare organizations to measure, benchmark, assess, and communicate the results of their PBM programs<sup>12</sup>**

- The MAPBM network is comprised of voluntarily participating hospitals, on an annual basis. The database is compiled annually including all hospital discharges for various surgical procedures based on ICD-9/10 procedure codes. It includes de-identified patient-level data records from laboratory, pharmacy, transfusion, surgery, and administrative hospital data sources
- Translating PBM clinical guidelines into a set of quality indicators (QI) to measure clinical practice

# Methodology

## Study variables

- Transfusion rate
- PBM interventions (QIs)<sup>12</sup>

| Clinical recommendation  | PBM Quality Indicator (QI) |  |
|--|----------------------------|--|
| Assess preoperative anaemia early enough to implement appropriated treatment | Q1                         | % of patients with timely preoperative screening of anaemia <sup>1</sup>         |
| Assess preoperative iron metabolism  | Q2                         | % of patients with timely preoperative screening of iron deficiency <sup>1</sup> |
| Treat preoperative anaemia   | Q3                         | % of anaemic patients with timely preoperative treatment <sup>2</sup>            |
| Preoperative anaemia is a contraindication for elective surgery              | Q4                         | % of anaemic patients at the time of surgery                                     |
| Apply regional anaesthesia to reduce blood loss                              | Q5                         | % of patients under spinal anaesthesia   |
| Minimize surgical bleeding with antifibrinolytics                            | Q6                         | % of patients treated with antifibrinolytics perioperatively                     |
| Apply restrictive transfusion thresholds                                     | Q7                         | % of patients transfused with Hb $\geq$ 8 g/dl                                   |
| Apply single-unit RBC transfusion approach                                   | Q8                         | % of single-unit transfused patients   |

# Results

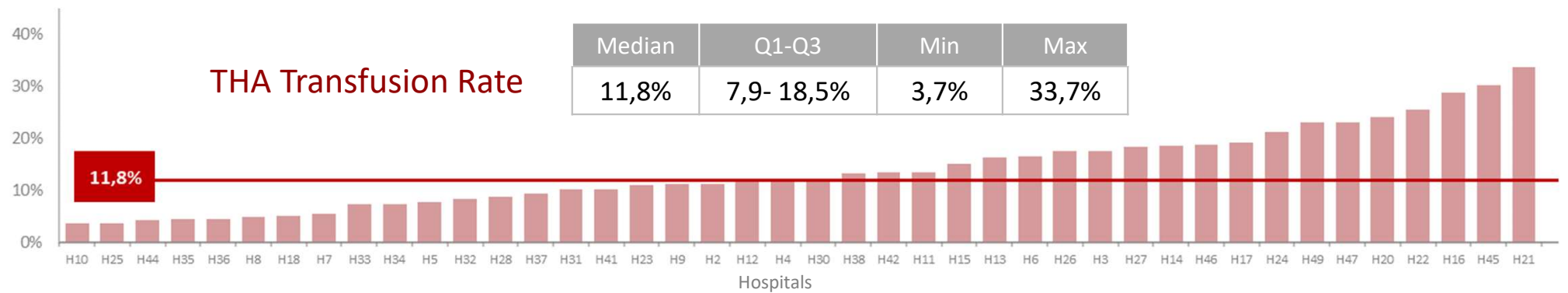
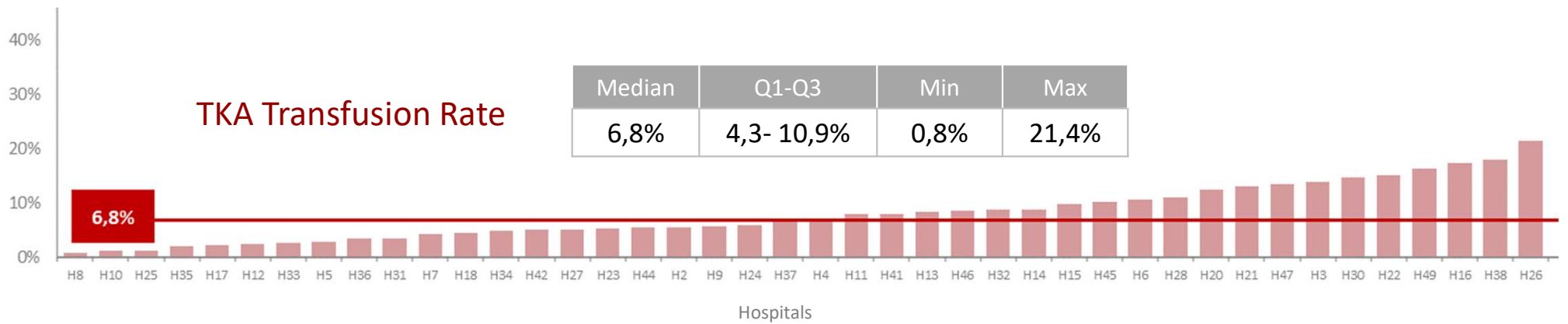
42 hospitals with a total of 28.682 episodes, 18.244 for TKA and 10.438 for THA analyzed

| Hospital Characteristics   | Hospitals      | N = 42 |
|----------------------------|----------------|--------|
|                            | By size        |        |
|                            | < 200 beds     | 9%     |
|                            | 200 – 500 beds | 43%    |
|                            | 501-1000 beds  | 38%    |
|                            | > 1000 beds    | 10%    |
| By fellowship capabilities |                |        |
|                            | Teaching       | 67%    |
|                            | Non-Teaching   | 33%    |
| By type of provision       |                |        |
|                            | Public         | 96%    |
|                            | Private        | 4%     |

| Patient Characteristics | TKA              | THA              |
|-------------------------|------------------|------------------|
|                         |                  | N = 18244        |
|                         | Median (Q1-Q3)   | Median (Q1-Q3)   |
| Age in years            | 70,6 (70,2-71,5) | 66,2 (65,0-67,1) |
| Women (%)               | 66,4 (62,9-70,1) | 44,4 (41,1-50,0) |
| Comorbidity index       | 1,4 (1,1-1,6)    | 1,1 (1,0-1,4)    |

# Results

Median hospital transfusion rate is 6,8% for TKA and 11,8% for THA

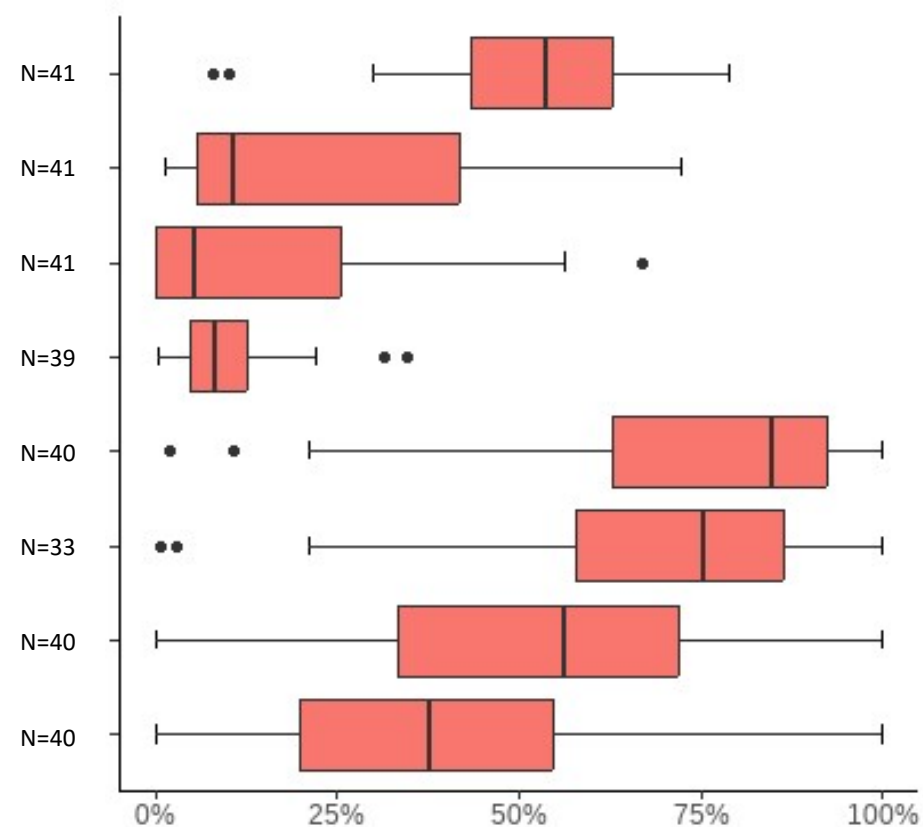




# Results

## Total Knee Arthroplasty (TKA) PBM Quality Indicators

|    |  |
|----|--|
| Q1 | % of patients with timely preoperative screening of anaemia <sup>1</sup>         |
| Q2 | % of patients with timely preoperative screening of iron deficiency <sup>1</sup> |
| Q3 | % of anaemic patients with timely preoperative treatment <sup>2</sup>            |
| Q4 | % of anaemic patients at the time of surgery                                     |
| Q5 | % of patients under spinal anaesthesia   |
| Q6 | % of patients treated with antifibrinolytics perioperatively                     |
| Q7 | % of patients transfused with Hb $\geq$ 8 g/dl                                   |
| Q8 | % of single-unit transfused patients   |

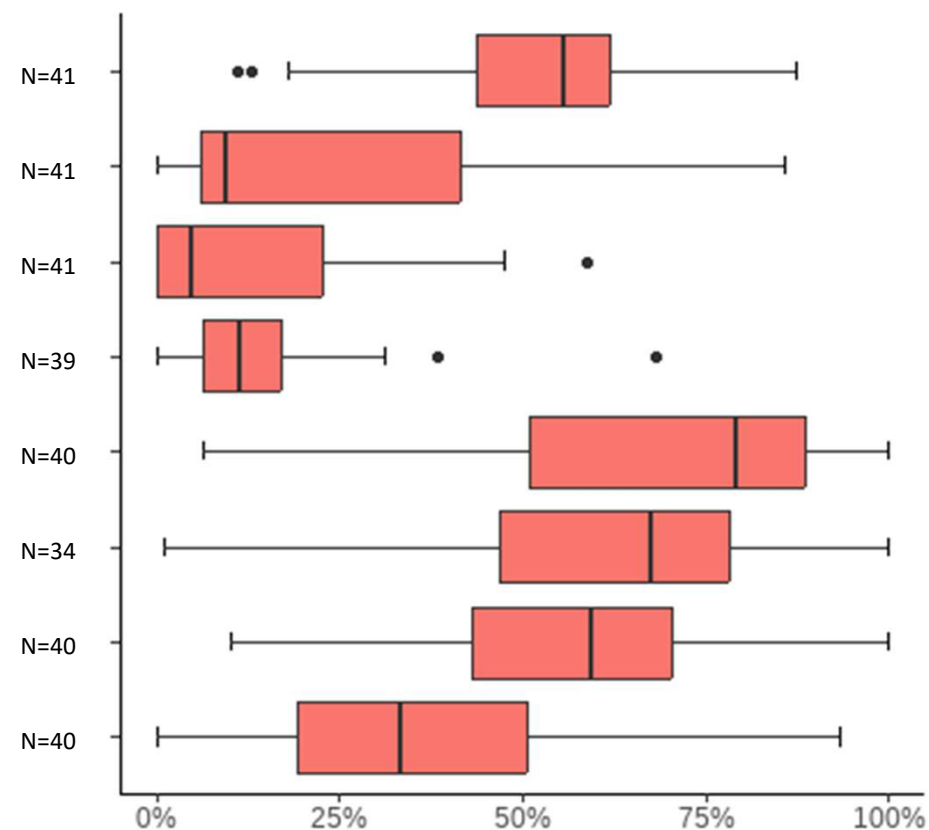


1. Laboratory test 21-90 days before surgery; 2. Treatment 7-90 days before surgery (IV iron/ESA considered only); N: Number of Hospitals

# Results

## Total Hip Arthroplasty (THA) PBM Quality Indicators

|    |  |
|----|--|
| Q1 | % of patients with timely preoperative screening of anaemia <sup>1</sup>         |
| Q2 | % of patients with timely preoperative screening of iron deficiency <sup>1</sup> |
| Q3 | % of anaemic patients with timely preoperative treatment <sup>2</sup>            |
| Q4 | % of anaemic patients at the time of surgery                                     |
| Q5 | % of patients under spinal anaesthesia   |
| Q6 | % of patients treated with antifibrinolytics perioperatively                     |
| Q7 | % of patients transfused with Hb $\geq$ 8 g/dl                                   |
| Q8 | % of single-unit transfused patients   |



1. Laboratory test 21-90 days before surgery; 2. Treatment 7-90 days before surgery (IV iron/ESA considered only); N: Number of Hospitals

# Conclusions

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**Wide and unjustified inter-hospital variation was found in transfusion rates (in line with studies from other geographies)**

**Hospital variability was found high for all PBM strategies**

**Despite evidence and guidelines, the implementation of PBM clinical pathways for major elective orthopedic surgery across hospitals is suboptimal**

**PBM interventions improve patient safety and could reduce healthcare costs. Further efforts are needed to consolidate the adoption of guidelines-based PBM strategies in routine hospital standards**