Budget Impact of Patient Blood Management in the Cardiovascular Surgery Department of a Turkish Private Hospital

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INTRODUCTION

- The implementation of Patient blood management (PBM) is a patient-centered, evidence-based multidisciplinary approach that aims to optimize hemoglobin concentration, maintain hemostasis and minimize blood loss in elective surgeries.[1-3]
- Anemia, bleeding and exposure to allogeneic products are risk factors for morbidity and mortality in elective surgery.[4-8]
- These risk factors bring about a negative clinical and economic impact on healthcare systems via prolonged length of stay in hospital (LOS), re-hospitalizations and increased risk of adverse events and complications.
- The Ministry of Health (MoH) of Turkey embarked on a project titled '*Technical Assistance for Improving Blood Transfusion Management in Turkey*' in March 2019 with assistance from the European Union.[9]

OBJECTIVES

- The objective of this study is to predict the potential budget impact of implementing patient blood management (PBM) in the cardiovascular surgery department of a Turkish private hospital (Istanbul Florence Nightingale Hospital).

METHODS

- In this study two different budget impact analyses, based upon the implementation of PBM, were conducted in the cardiovascular surgery department of the Istanbul Florence Nightingale Hospital.
- In the first analysis (see **Figure 1**), budget savings from implementing preoperative anemia measures (first pillar of PBM) were estimated for both the total number of patients and for the Social Security Institution (SSI) patients between 2020-2022. This model includes estimations of risk of post-operative complications based on the findings of the meta-analysis by Kleinerüschkamp et al (2019)[10].
- The second budget impact analysis incorporated the potential impact of transfusion on patient outcomes. The impact of transfusion was measured by expected complications as a result of transfusion. Hence, averted transfusions and averted complications formed the basis of the analysis. Two meta-analyses by Althoff et al (2019) and Ferraris et al (2015) were used in estimations[11,12]. (**Figure 2)**
- A third analysis was conducted to assess the potential impact of PBM implementation on length of stay (LOS).
- Preoperative iron deficiency anemia treatment was made with intravenous (IV) ferric carboxymaltose (FCM) (two 500 mg per 10 mL vials before surgery).

RESULTS

- The first budget impact analysis concluded that 30 complications could have been avoided and **4,189,802 TRY (194,460 €)** could have been saved with the implementation of the first pillar of PBM for all cardiovascular operations in the period 2020-2022 (see **Table 1**). In the analysis for SSI patients, the results showed that 11 complications could have been avoided and the SSI could have saved 1,330,096 TRY (62,020€).
- The second budget analysis focused on the three pillars of PBM showed that 143 transfusions and 29 complications could have been avoided and the hospital could have saved **6,174,434 TRY (286,521€)** for all patients (see **Table 2 & 3**). As for the SSI patients, the results showed that 9 complications could have been avoided and 1,783,412 TRY (82,773 €) could have been saved by the SSI from a single hospital.
- The implementation of PBM decreased the **LOS by 0.45 days** (MD -0.45, 95%CI, -0.65 to -0.25, p<0.00001). As a result, 137 more patients could have been operated in the period 2020-2022.

CONCLUSIONS

- PBM is a budget saving option for both the SSI and hospital perspectives. Adopting PBM programs in both public and private hospitals is recommended in the Turkish health system.

Figure 1. Budget impact of First Pillar Implementation

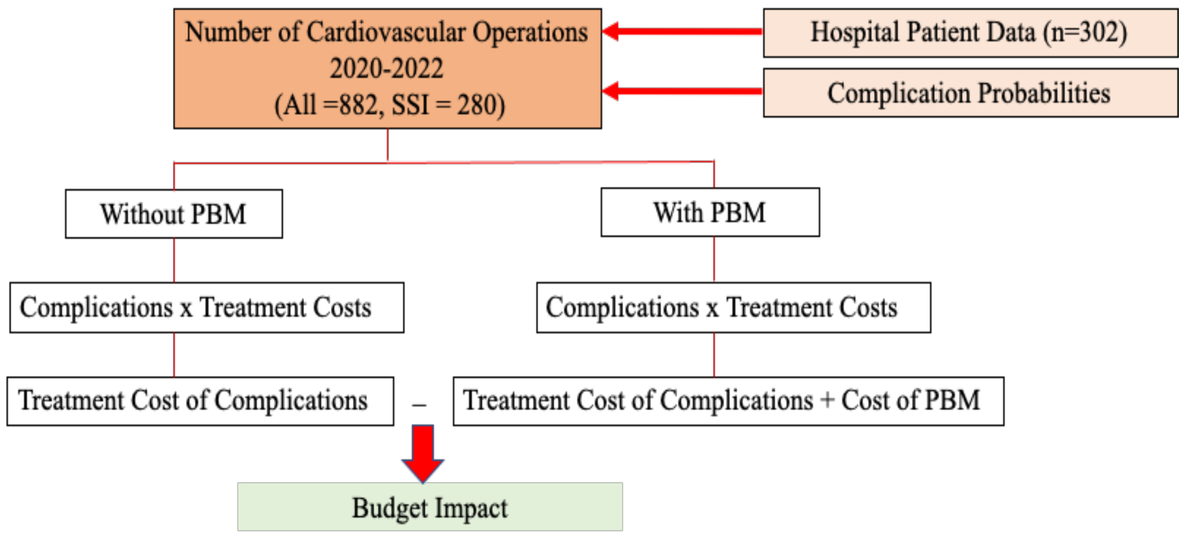

Figure 2. Budget impact of PBM (Three Pillars) Implementation

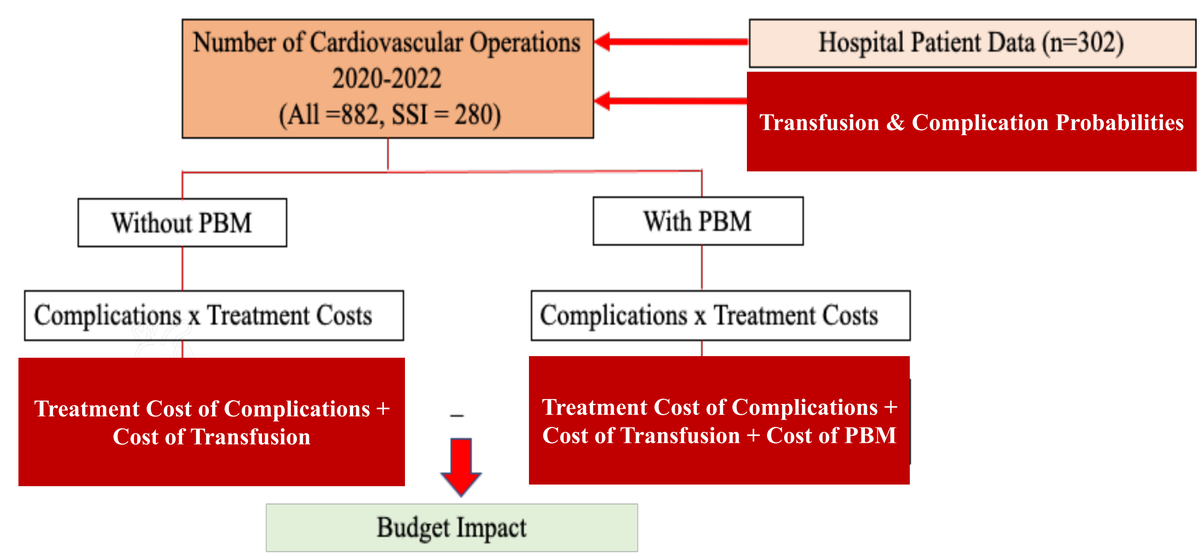

Table 1. Budget impact of implementing the First Pillar of PBM (2020-2022)

	Cost of Treatment without First Pillar (TRY)	Cost of Treatment with First Pillar (TRY)	Budget Impact of Complications (TRY)
Sepsis with pneumonia	420,202	171,842	-248,360
Sepsis without pneumonia	258,031	105,461	-152,570
Acute renal failure	5,627,740	2,116,030	-3,511,710
Acute myocardial infarction	406,897	9,400	-397,497
Acute stroke	678,140	235,564	-442,576
Total	7,391,011	2,638,298	-4,752,713
Cost of First Pillar of PBM		562,911	562,911
Total Budget Saving from First Pillar			4,189,802
Total Budget Saving from First Pillar (€)*			194,460

Table 2. Transfusions and related complications before and after PBM implementation

	Without PBM (n=882)	With PBM (n=882)
No of transfused patients	488	345
No of non-transfused patients	394	537
Total	882	882

	Complications without PBM	Complications with PBM
Sepsis	53	37
Renal Failure	19	13
Myocardial infarction	18	13
Stroke	7	5
Total	97	68

Table 3. Budget impact of implementing PBM (2020-2022)

	Cost of Treatment without PBM (TRY)	Cost of Treatment with PBM (TRY)
Sepsis	1,184,588	837,691
Renal failure	17,987,759	12,720,194
Myocardial infarction	1,018,033	719,911
Stroke	1,023,793	723,984
Total complication costs	21,214,173	15,001,780
Total cost of transfusion	1,471,232	1,509,191
Total	22,685,405	16,510,971
Total budget saving from PBM (TRY)		6,174,434
Total budget saving from PBM (€)		286.571

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