

# CARBETOCIN FOR THE PREVENTION OF POSTPARTUM HAEMORRHAGE DUE TO UTERINE ATONY FOLLOWING VAGINAL DELIVERY – A RETROSPECTIVE COST-BENEFIT ANALYSIS BASED ON CLINICAL EXPERIENCE FROM POLISH MEDICAL CENTRES

## Background

The most common cause of postpartum haemorrhage (PPH) is uterine atony [1-5]. According to the World Health Organization, PPH complicates up to 10% of deliveries [5]. Postpartum haemorrhage is listed as one of the main causes of perinatal mortality among women both in Poland and worldwide [4-5]. Postpartum haemorrhages significantly impact patients' health and, simultaneously, burden hospitals. Carbetocin indicated for the prevention of postpartum haemorrhage due to uterine atony might be a solution for this burden. It is demonstrated, that carbetocin effectively and safely reduces the frequency of postpartum haemorrhages following vaginal delivery (frequency of PPH 8.7% in comparison with 12.2% in the case of oxytocin [6]).

## Objectives

The main objective of the analysis was to evaluate the impact of postpartum haemorrhage on healthcare providers' budgets and resources based on the data from three Polish medical centres and, subsequently, to investigate if using carbetocin to prevent PPH due to uterine atony following vaginal delivery would benefit hospitals.

## Materials and methods

Real-world data on costs and resource use was retrospectively collected in three large medical centres in Poland. Data were generated from anonymized clinical records of patients hospitalised between 2018 and 2023.

Three subpopulations of women who underwent vaginal delivery were considered:

- P1 - women without postpartum haemorrhage
- P2 - women with heavy postpartum haemorrhage
- P3 - women with postpartum haemorrhage other than heavy.

Heavy PPH was defined as the loss of at least 1000 ml of blood, while PPH other than heavy was related to the loss of blood < 1000 ml.

The following categories of data were gathered in the hospitals and used in the analysis:

- Unit costs of the resources:
  - blood substitutes and drugs (e.g., uterotonics) given to the patients
  - medical tests and medical procedures/interventions connected with the PPH management
  - wages of the medical staff
  - person-day in particular wards
- Average use of medical resources mentioned above
- The duration of the patient's and newborn's stay in hospital wards and time spent by the medical staff members on care over the patient and newborn.

## Results

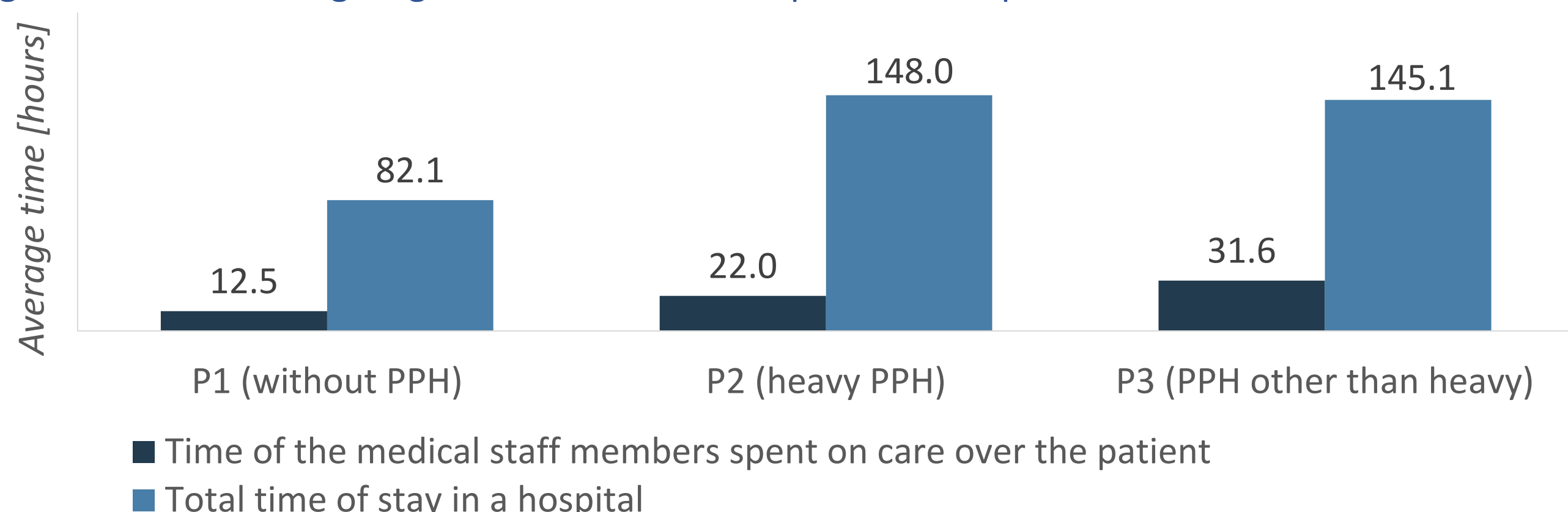
The results are based on the analysis of the medical records of 155 women (Table 1.).

Table 1: Number of medical records used as a source of data in the analysis

Subpopulation	Number of medical records in the analysis
P1. Patients without postpartum haemorrhage	70
P2. Patients with heavy haemorrhage following vaginal delivery	58
P3. Patients with haemorrhage other than heavy following vaginal delivery	27
Sum	155

The impact of postpartum haemorrhage on hospital resource use was investigated directly (i.e. drugs, medical products, tests, medical procedures or interventions assigned to the categories of resources used to manage PPH) and indirectly (i.e. time of stay in a hospital and time of the medical staff members spent on care over the patient with PPH vs. the patient without PPH). The comparison of subpopulations regarding the time of caregiving revealed, that a woman experiencing postpartum haemorrhage (heavy or other than heavy) requires 77% to 154% longer care from the medical staff members than a woman without PPH. The occurrence of postpartum haemorrhage also has an impact on the total hospitalisation length: the average patient's hospital stay in the case of subpopulations P2 and P3 (i.e. with heavy or other than heavy PPH) was 63 to 66 hours longer than in the subpopulation of patients who didn't experience PPH (Figure 1.).

Figure 1: Time of caregiving and the total time of patient's hospitalisation



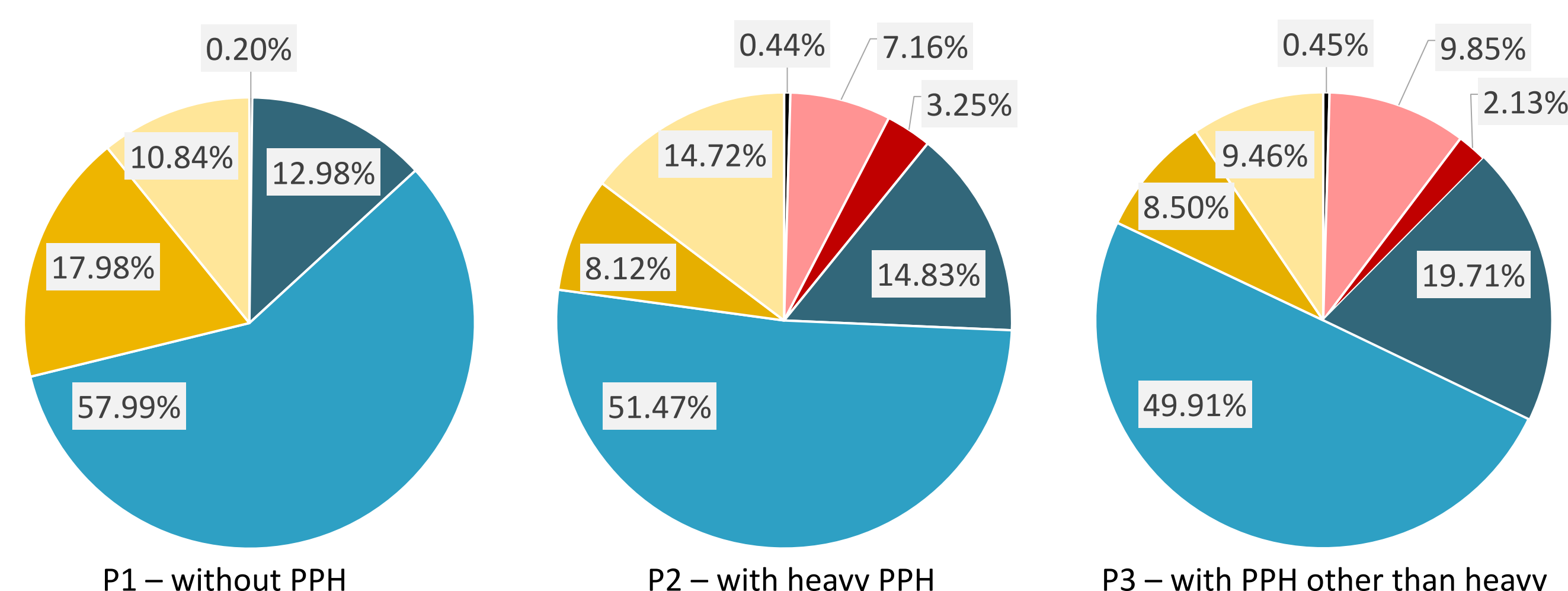
## Results (continued)

The average hospital costs per patient divided into categories of utilised resources were calculated for each of the three subpopulations (Table 2.). The total impact of postpartum haemorrhage (heavy or other than heavy) on hospital expenses reached the amount of EUR 1,251 to EUR 1,754 per patient. The largest differences between costs per patient without PPH and costs per patient experiencing PPH were observed for the following cost categories: patient's stay in the hospital, medical staff care over the patient, drugs/products used in the case of PPH, and tests/procedures performed in the case of PPH. Hospital cost categories distribution calculated in each subpopulation showed that around half of expenses is connected with patient's stay in the hospital (Figure 2).

Table 2: Hospital costs per patient divided into categories of utilised resources

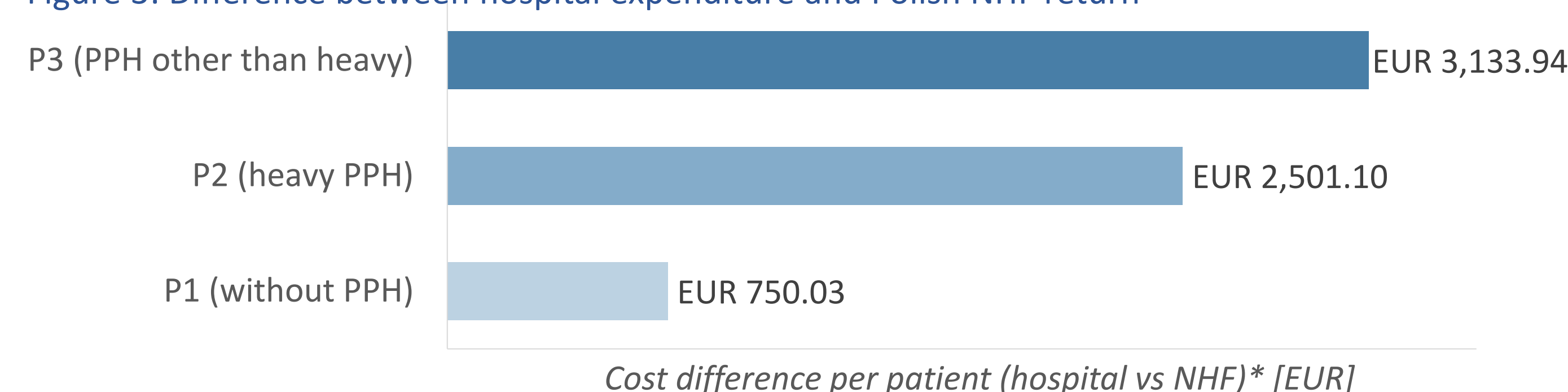
Cost category	Weighted average cost/patient in subpopulation [EUR]		
	P1 - without PPH	P2- with heavy PPH	P3 – with PPH other than heavy
Uterotonic drugs	4.28	14.98	17.30
Drugs/products used in the case of PPH (uterotonics excluded)	0.00	242.16	382.83
Tests/procedures performed in the case of PPH	0.00	109.95	82.65
Medical staff care over the patient	276.70	501.68	765.95
Patient's stay in the hospital	1,236.18	1,741.12	1,939.20
Medical staff care over the newborn	383.29	274.78	330.33
The newborn's stay in hospital	231.12	497.91	367.49
<b>Total cost</b>	<b>2,131.56</b>	<b>3,382.57</b>	<b>3,885.74</b>

Figure 2: Hospital expenditure distribution by the categories of utilised resources



In addition, the average hospital expenditure per patient in each subpopulation was compared with the average refund paid by the Polish National Health Fund (NHF) (Figure 3.). The calculations revealed, that the refund obtained from the public payer constitutes only a part of hospital expenditure and the healthcare providers are incurred with most hospitalisation costs. The largest difference was observed in hospitalisations connected with PPH occurrence. Ideally, the refund from the public payer should cover the total costs of hospitalisation.

Figure 3: Difference between hospital expenditure and Polish NHF return



\* Calculated based on data from 2 medical centres with a unified way of accounting hospitalisation with the public payer

## Conclusions

- The occurrence of haemorrhage after a vaginal delivery significantly burdens the hospital (both organisationally and financially) compared to delivery without PPH.
- The expenses associated with the healthcare services provided to a patient experiencing haemorrhage after vaginal delivery are, in practice, mainly charged to the healthcare provider, as the refund received from the Polish public payer is usually lower than the costs incurred by the hospital.
- Assuming, that the population of 1,000 women undergoing vaginal delivery would use carbetocin instead of oxytocin for PPH prophylaxis, 35 additional postpartum haemorrhages would be avoided, generating savings of approximately EUR 31,200 from the perspective of Polish healthcare providers.
- Widespread use of effective PPH prevention by Carbetocin can impact the saving of hospital resources (personnel and budget) in Poland.

## References

- (1) Kwiatkowski et al. Ginekologia i Perinatologia Praktyczna 2022;7(1):34-45.
- (2) Kwiatkowski et al. Ginekologia i Perinatologia Praktyczna 2021;6(2):100-105
- (3) Śmieja et al. Ginekologia i Perinatologia Praktyczna 2018;3(4):137-142.
- (4) Nowacka et al. I Konferencja edukacyjna krwawienia w ginekologii w praktyce na podstawie przypadków klinicznych A.D. 2016
- (5) WHO recommendations: uterotonics for the prevention of postpartum haemorrhage. World Health Organization; 2018
- (6) Gallos, I. D. et al. Cochrane Database of Systematic Reviews; 2018;12(12):CD011689

