

Uncovering the Cost of Red Blood Cell and Platelet Transfusions in Select North American and European Countries with Cost Implications in a Trial Example

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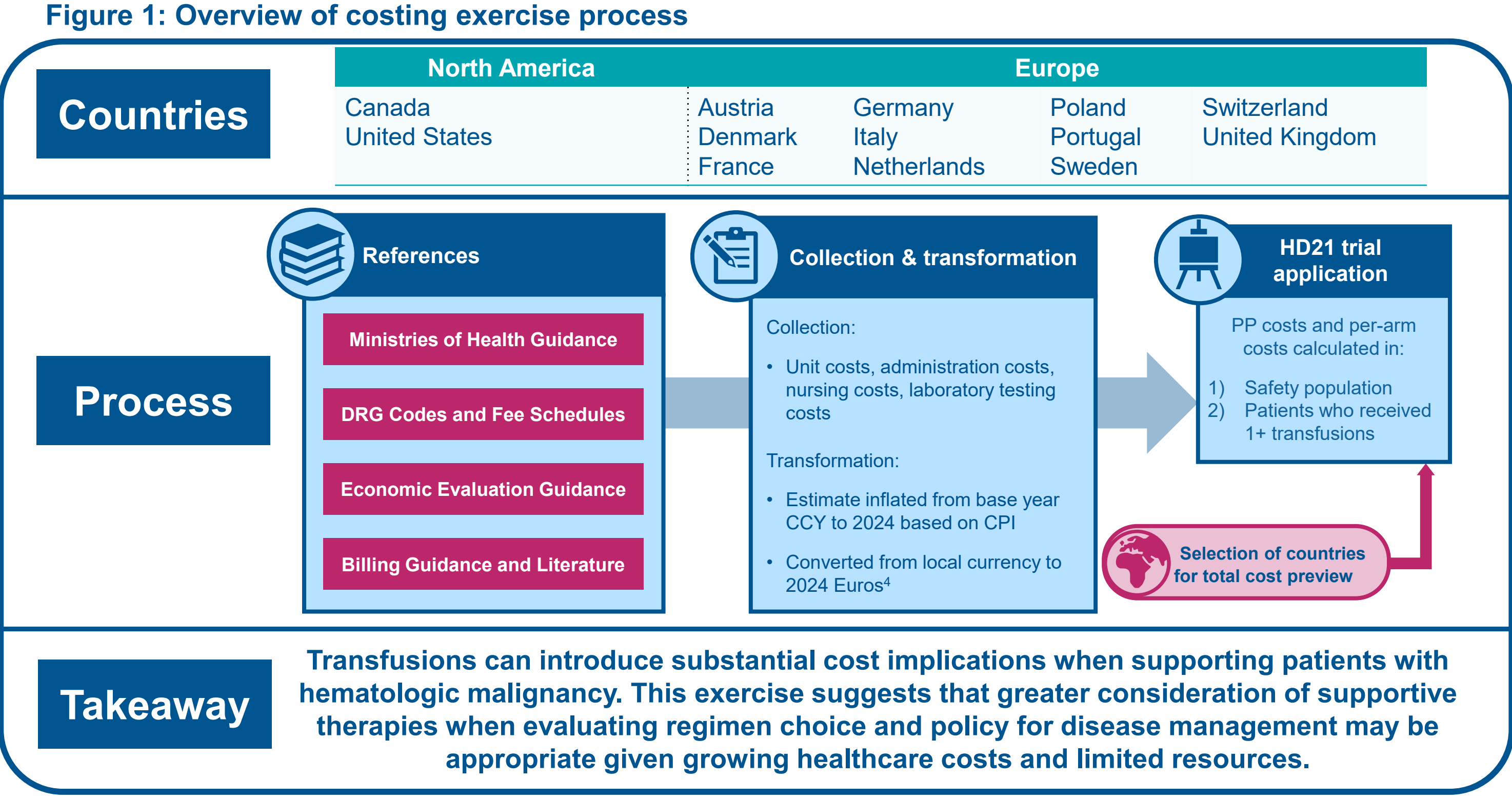
Background

- As patients receive ever novel treatment regimens for oncologic and hematologic malignancies, supportive therapies they might receive during or after their primary intervention can sometimes be overlooked at the initial clinical decision-making stage. However, oncology and hematology are two areas in need of consideration of holistic regimen value and supportive therapy needs at treatment initiation, especially when receiving complex regimens that can induce blood line depletion over a prolonged treatment period. As 75% of transfusions are delivered to hematology and oncology patients, these have emerged as an element of treatment worth considering at onset.¹
- While transfusions are a major element of supportive therapy, considerations for acquisition and treatment-related costs are seldom considered. In recent evaluations in the European region, the high cost associated with transfusions is a significant challenge healthcare systems face in terms of delivery and requirements; this may be further exacerbated by low blood donations rates.²
- Considering these challenges, we evaluated available cost estimates for transfusions in target regions to develop a better understanding of the cost burden, variability between countries, and related implications of supportive therapies. This exercise leveraged transfusion rates in the HD21 frontline Hodgkin's lymphoma trial which focused on patients <60 years of age who received either BrECADD (brentuximab vedotin, etoposide, cyclophosphamide, doxorubicin, dacarbazine, dexamethasone) or eBEACOPP (escalated bleomycin, etoposide, doxorubicin, cyclophosphamide, vincristine, procarbazine, and prednisone)³ to illustrate the cost of managing transfusion needs within a heme-oncology treatment setting as a proxy for real-world consequences of regimens with clear supportive therapy requirements.

Objectives

- The objective of this exercise was to present the cost of transfusions among representative countries and apply this understanding to an example of the cost implications of such a supportive therapy in a trial-based example.
- To investigate the appropriateness of taking into consideration supportive therapy risks when deciding on therapy for high-burden illnesses from a cost perspective.

Methods



Abbreviations in Figure 1: CCY, currency; CPI, consumer price index; DRG, diagnosis-related group; PP, per-patient

Country Inclusion and References

- Regions included in this analysis were Europe (Austria [AT], Denmark [DK], France [FR], Germany [DE], Italy [IT], the Netherlands [NL], Poland [PL], Portugal [PT], Sweden [SD], Switzerland [CH], the United Kingdom [UK]) and North America (Canada [CA] and the United States [US]) to contextualize transfusion costs based on public costing resources (as described in *Table 1* below) among the reference categories listed in *Figure 1* above.

Collection

- Components included in the per-transfusion cost estimates varied by country based on local guidance and available tariffs. For example, in the US case, the estimate included the unit, procedure, testing, and freeze/thaw costs.
- Red blood cell (RBC) costing*: Where rates were available for a single RBC unit (any base volume from 250–500 mL), these were recorded. The cost of 2-unit (2U) RBC transfusions were calculated to reflect an average transfusion within applicable therapeutic areas for our trial exercise (e.g., oncology, hematology).
- Platelet (PLT) costing*: A similar approach was taken for PLT transfusions; however, in countries where holistic categorical pricing is used for blood-product transfusions without differentiation by subtype, the cost of the product and its infusion support was assumed to be the same as RBC transfusion. Only single-unit rather than multi-unit platelet transfusion costs were calculated due to variable practice across regions.

Transformation

- Estimates were inflated to their 2024 value based on each country's CPI by referring to bureau of statistics, national bank references, or online global resources. All inflated estimates were converted to Euros as the index currency.

Illustrative Application

- Finally, costs identified were applied to transfusion rates from the HD21 trial to estimate total costs per trial arm as well as cost per-patient (PP).
- This exercise involved rates within the HD21 study including 3.6 v 4.3 RBC and 2.2 vs 2.6 PLT PP transfusions (in the BrECADD and eBEACOPP arms, respectively) among those who received at least one transfusion. Similarly, 0.87 vs 2.25 RBC and 0.37 vs 0.86 PLT PP transfusions were observed (BrECADD and eBEACOPP, respectively) among the safety population.³

Results

- The estimates from each country's costing exercise can be found in the final two columns of *Table 1* for two-unit (2U) RBC transfusions and single unit (1U) PLT transfusions.

Table 1: Costing method by country

CTRY	Source(s) for costs and currency conversions	RBC costing method				PLT costing method				Orig. CCY, Year	2U RBC	1U PLT
		Admin	Nursing	Testing	Unit	Admin	Nursing	Testing	Unit			
AT	LKF Stationary Model 2024 ⁵	X				X				EUR, 2024	741.14	971.87
CA	CIHI CACS, ⁶ IHDA, ⁷ Bank of Canada ⁸	X				X				CAD, 2019	514.17	514.17
FR	SHI Tariffs – CCAM ⁹		X			X			X	EUR, 2024	115.28	69.14
DE	aG-DRG flat-rate payment catalog 2023 ¹⁰				X				X	EUR, 2023	1,400.12	610.65
DK	National hospital DRG Tariff ¹¹	X	X	X	X	X	X	X	X	EUR, 2024	901.16	266.61
IT	Italian DRG day hospitalization data ¹²	X				X				EUR, 2014	261.52	261.52
NL	VWS Netherlands Costing Manual (2014) ¹³ Dutch Healthcare Institute Advice Publication (2022) ¹⁴	X			X	X		X	X	EUR, 2014/22	715.59	684.3
PL	NHF schedule of fees (ordinance 37 attachments a, b and c) ¹⁵	X			X	X			X	Zloty, 2024	247.49	293.79
PT	Diario da Republica No.132 (2017) ¹⁶	X		X	X	X	X		X	Euro, 2017	870.60	214.60
SE	The Southern Healthcare Region's price list for 2024 ¹⁷	X	X			X	X			SEK, 2024	1,751.62	1,664.94
CH	SwissDRG ¹⁸	X			X	X			X	CHF, 2024	7,117.59	8,723.55
GB	NHS National Cost Collection (National Schedule), ¹⁹ Bank of England ²⁰		X		X		X		X	GBP, 2022	875.31	474.07
US	"2023 Final Payment rate" from HOPPS, ²¹ CPT & HCPCS codes per AABB billing guide 23/24, ²² and PFS rates ²³	X	X	X	X	X	X	X	X	USD, 2023	1,716.15	821.76

Abbreviations in Table 1: AABB, Association for the Advancement of Blood & Biotherapies; admin, administration; CAD, Canadian Dollar; CHF, Swiss Franc; CPT, Current Procedural Terminology; CTRY, country; EUR, Euro; GBP, Pound Sterling; HCPCS, Healthcare Common Procedure Coding System; NHS, National Health Service; PFS, Physician Fee Schedule; SEK, Swedish Krona; USD, United States Dollar; VWS, Ministry of Health, Welfare, and Sport.

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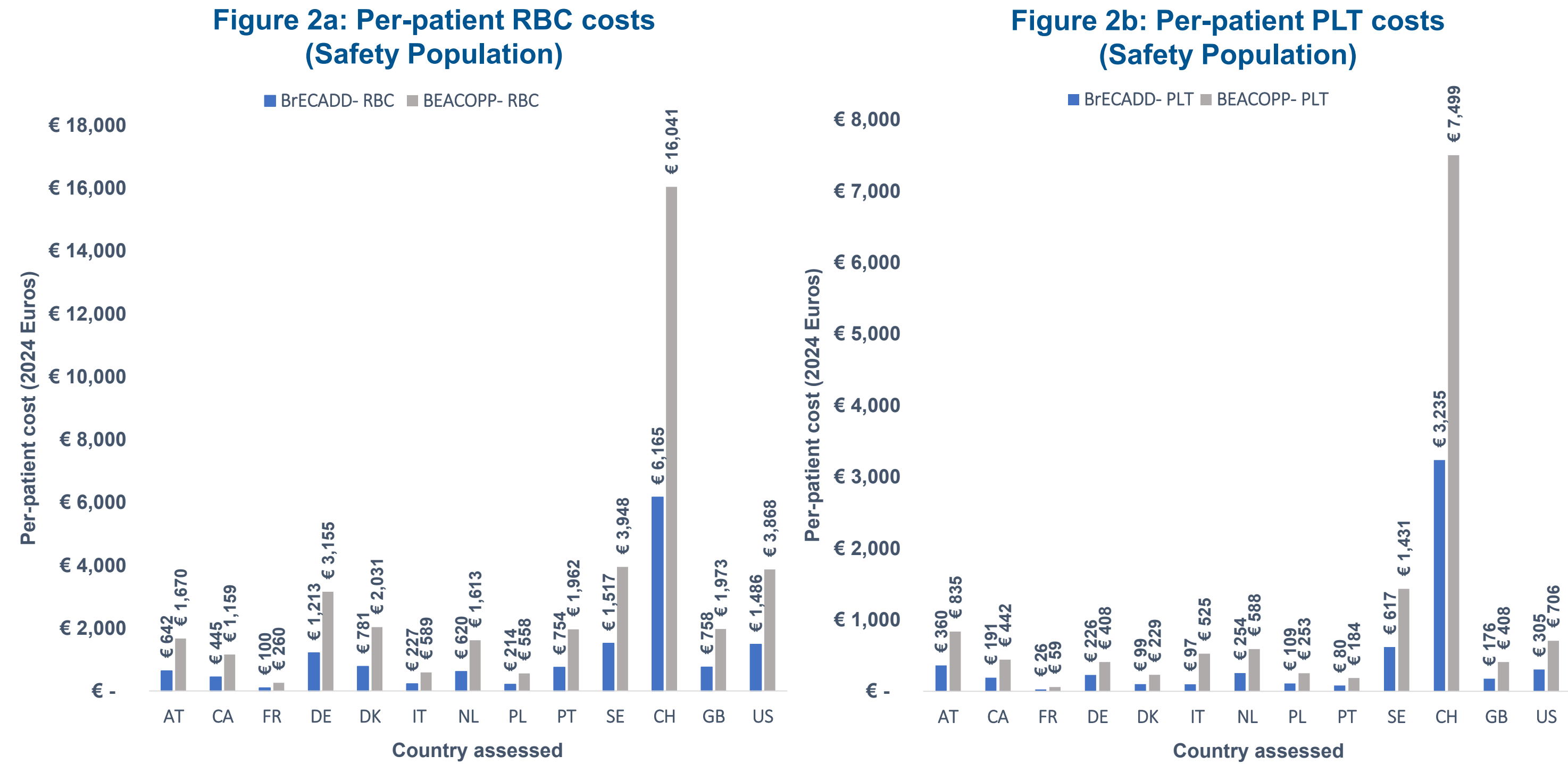
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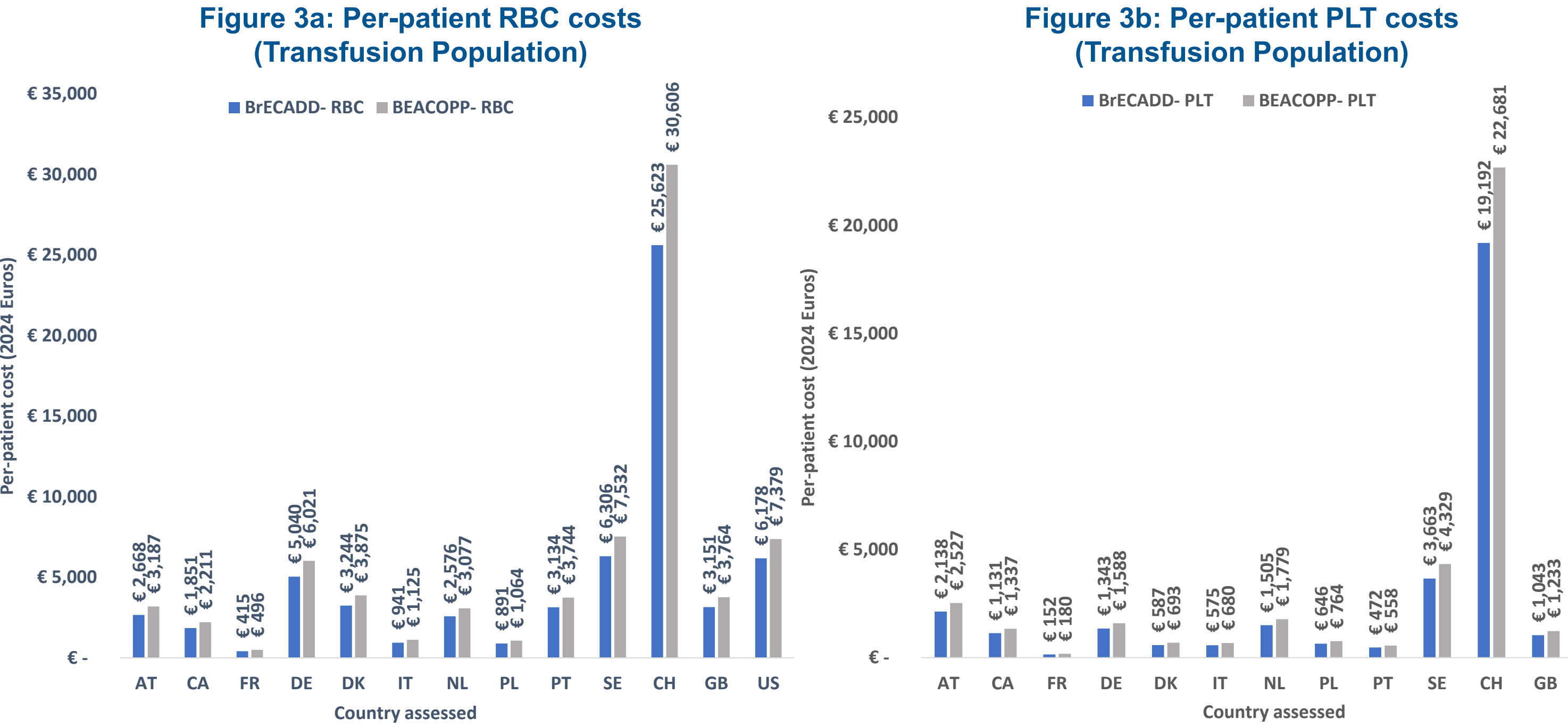
- The median illustrative cost per RBC and PLT transfusion within the 13 included countries included in *Table 1* were €870.60 and €514.17, respectively. Within the European region, the median cost estimate was €870.60 for 2U RBC transfusions and €474.07 for 1U PLT transfusions.

Illustrative HD21 application exercise in Safety Population

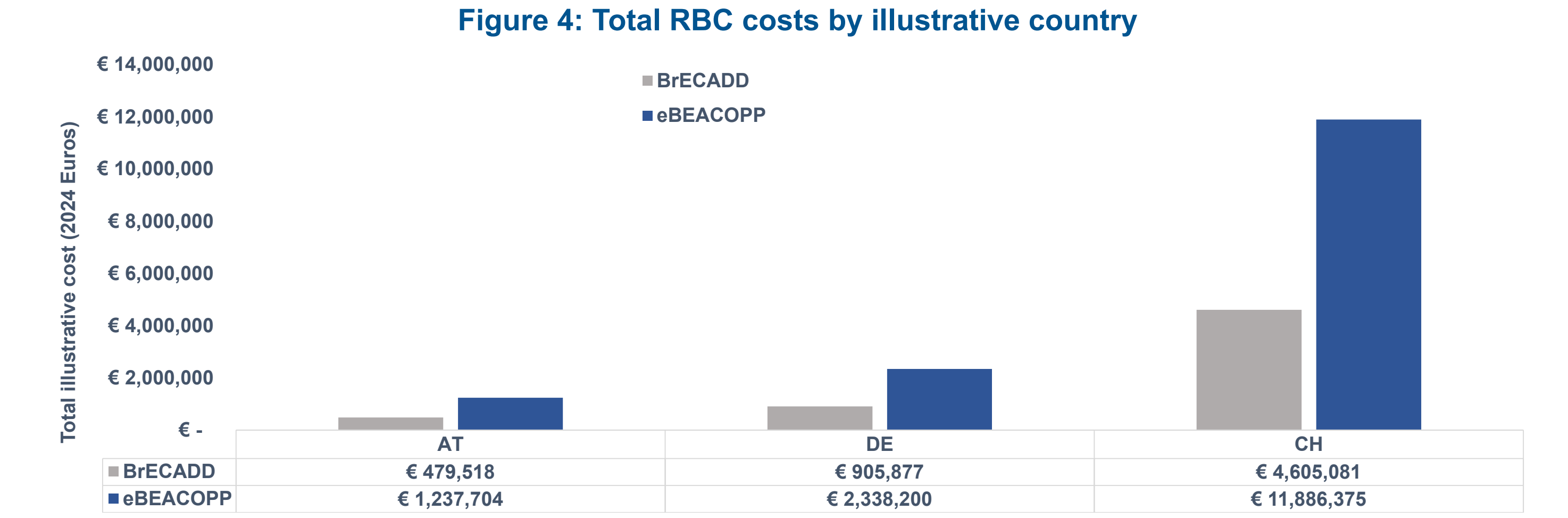


- As depicted in *Figure 2a*, the median PP estimate within the safety population was €754.05 in the BrECADD arm and €1,962.08 in the eBEACOPP arm for a 2U RBC transfusion, while in *Figure 2b* the median PP estimate was €190.66 in the BrECADD arm and €524.94 in the eBEACOPP arm for a 1U PLT transfusion.
- After applying these costs to the proportions of the HD21 trial, it was found that between the estimated BrECADD and eBEACOPP PP costs there was an illustrative 61% difference for RBC transfusions and a 57% cost saving for PLT transfusions in favor of the BrECADD arm.
- When considering a country example, when German costs were applied to HD21 trial arms while assuming receipt of 2U RBC and 1U PLT transfusions, PP cost savings were €1,943 and €299, respectively, for BrECADD and eBEACOPP. Similarly, costing via the Swiss approach resulted in a PP cost saving of €9,876.22 and €4,264.35 for 2U RBC and 1U PLT transfusions, respectively.

Illustrative HD21 application exercise in Transfusion Population



- As depicted in *Figure 3a*, the median estimate within the transfusion population was €2,668.10 in the BrECADD arm and €3,186.90 in the eBEACOPP arm for a 2U RBC transfusion, while in *Figure 3b* the median estimate was €1,343.42 in the BrECADD arm and €1,587.68 in the eBEACOPP arm for a 1U platelet transfusion.



- Figure 4* shows the total cost for 2U RBC transfusions by trial arm via CH, DE, and AT costing approaches. These totals were calculated as the country estimates (€7,117.59, €1400.12, and €741.14, respectively) applied to the number of RBC transfusion events accounted for by arm (647 events for BrECADD and 1,670 events for eBEACOPP). The illustrative "total" cost for each arm resulted in a cost saving of the aforementioned 61% realized as €7,281,295 by the CH costing perspective, €1,432,322 by the DE costing perspective, and €758,186 by the AT costing perspective.

Limitations

- Given the scope of patients receiving complex oncology treatments globally, a broader investigation should be undertaken to account for additional regions with different management schematics and costing approaches.
- Within North America, cost estimates were informed by publicly available listings from a single Canadian province and by public sector estimates in the US.
- Methods varied between countries based on data availability and guidance, introducing potential inconsistencies between countries or potential incompleteness.
- Future exercises should involve validation with local clinical experts to ensure proper reflection of clinical practice.

Conclusions and discussion

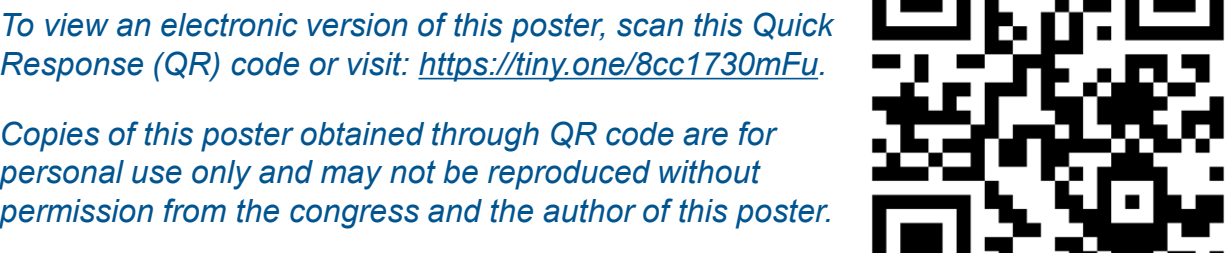
- The cost of transfusions as a supportive therapy can vary greatly between countries but carry a clear cost implication regardless of country perspective. While this analysis looked to identify within-transfusion costs, in many cases, there is a need for multiple blood units within a transfusion, multiple instances of transfusions, and management of adverse events that occur as a consequence of blood transfusion(s).^{24,25}
- As regimens and treatments in oncology and hematology continue to evolve, the holistic value of medicine that considers not just survival benefit but also patient utility, regimen safety, supportive therapy, and others becomes ever more important, especially when contextualized by cost burden and health system constraints.

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Disclosures

AM, PA, AZ, DC, ID, ML, SR, SML, VFP: employment and stock ownership at Takeda Pharmaceuticals. DS: employment at Cytel, Inc.



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