

# ANTIPLATELET THERAPY STRATEGIES IN HIGH BLEEDING RISK PATIENTS TREATED WITH COMPLEX PERCUTANEOUS CORONARY INTERVENTION: A DESCRIPTIVE OBSERVATIONAL STUDY

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## 1 Background

Following acute coronary syndrome (ACS) treated by percutaneous coronary intervention (PCI), guideline-directed dual antiplatelet therapy (DAPT) typically consists of 12 months of aspirin plus a P2Y<sub>12</sub> inhibitor.

Recent trials support de-escalation strategies in patients at high bleeding risk (HBR), whereas patients undergoing complex PCI are at increased thrombotic risk and may benefit from extended DAPT.

The overlap between these high bleeding and high thrombotic risk groups in contemporary practice is not well characterized.

## 2 Objective

The primary objective was to estimate the proportion of patients meeting both criteria; secondary objectives described discharge antiplatelet strategies across risk groups.

## 3 Methods

**Design**  
 Descriptive observational study conducted in the coronary care unit of the Montreal Heart Institute. The study covered a one-year period (May 1, 2024 – April 30, 2025), starting six months after publication of the 2023 CCS/CAIC antiplatelet guidelines to allow time for practice adoption.

**Study population**  
 Adults (≥18 years) hospitalized for acute coronary syndrome who underwent PCI with stent implantation were eligible. Exclusion criteria: cardiac surgery during index hospitalization, prior stent thrombosis, antiphospholipid syndrome, or thrombophilia.

**Data source**  
 Data were extracted from electronic health records, including catheterization reports, laboratory results, medical notes and discharge prescriptions.

**Collected data**  
 Demographic characteristics : Age, Sex, Weight, height, Body mass index

Bleeding risk assessment: High bleeding risk was assessed using the PRECISE-HBR score\*.  
 Procedural complexity : Procedural complexity was defined according to the 2023 CCS/CAIC complex PCI criteria†.

**Treatment variables :**

- Antiplatelet therapy prescribed at discharge
- Intended duration of dual antiplatelet therapy in patients not receiving long-term anticoagulation

**Additional variables :**

- Type of ACS: STEMI, NSTEMI, unstable angina
- Diabetes
- History of complex PCI within the previous 12 months

**Statistical Analysis**

- Target sample size: 309 patients to estimate the proportion meeting both HBR and complex PCI criteria (95% CI; margin of error 3.1%; expected prevalence 8.6%).
- Patients were randomly sampled in 7-day blocks throughout the study period to ensure temporal representativeness.

Proportions with 95% confidence intervals (Wald method) were estimated for four mutually exclusive groups:  
 • HBR only ; Complex PCI only ; Both HBR and complex PCI ; Neither HBR nor complex PCI  
 Analyses were repeated using very high bleeding risk (vHBR).

Among patients not receiving long-term anticoagulation, antiplatelet strategies were described within these subgroups and categorized as:

- Standard-duration DAPT with clopidogrel
- Standard-duration potent DAPT (ticagrelor or prasugrel)
- Short-duration DAPT: 1–3 months of DAPT followed by single antiplatelet therapy
- Reduced-intensity DAPT: de-escalation after 1–3 months from potent based DAPT to clopidogrel-based DAPT

**Legend**  
 \* PRECISE-HBR variables: estimated glomerular filtration rate, hemoglobin, white blood cell count, prior spontaneous bleeding requiring medical attention, oral anticoagulant use, platelet count <100 ×10<sup>9</sup>/L, cirrhosis with portal hypertension, active malignancy within 12 months, chronic bleeding diathesis, major surgery or trauma within 30 days before PCI, chronic NSAID or corticosteroid use.  
 † Complex PCI criteria : total stent length ≥60 mm, bifurcation treated with two stents, left main PCI, ≥3 stents implanted, ≥3 vessels treated, ≥3 lesions treated, atherectomy, chronic total occlusion PCI, bypass graft PCI.

## 4 Results

**Study population:** 309 patients included  
 • Median age: 69 years (IQR 61–77) ; Women: 27.2% ; STEMI: 44.7%

**Main outcome:**

- 35% met HBR criteria
- 43% underwent complex PCI
- 17.5% (95% CI: 13.3–21.7) met both HBR and complex PCI

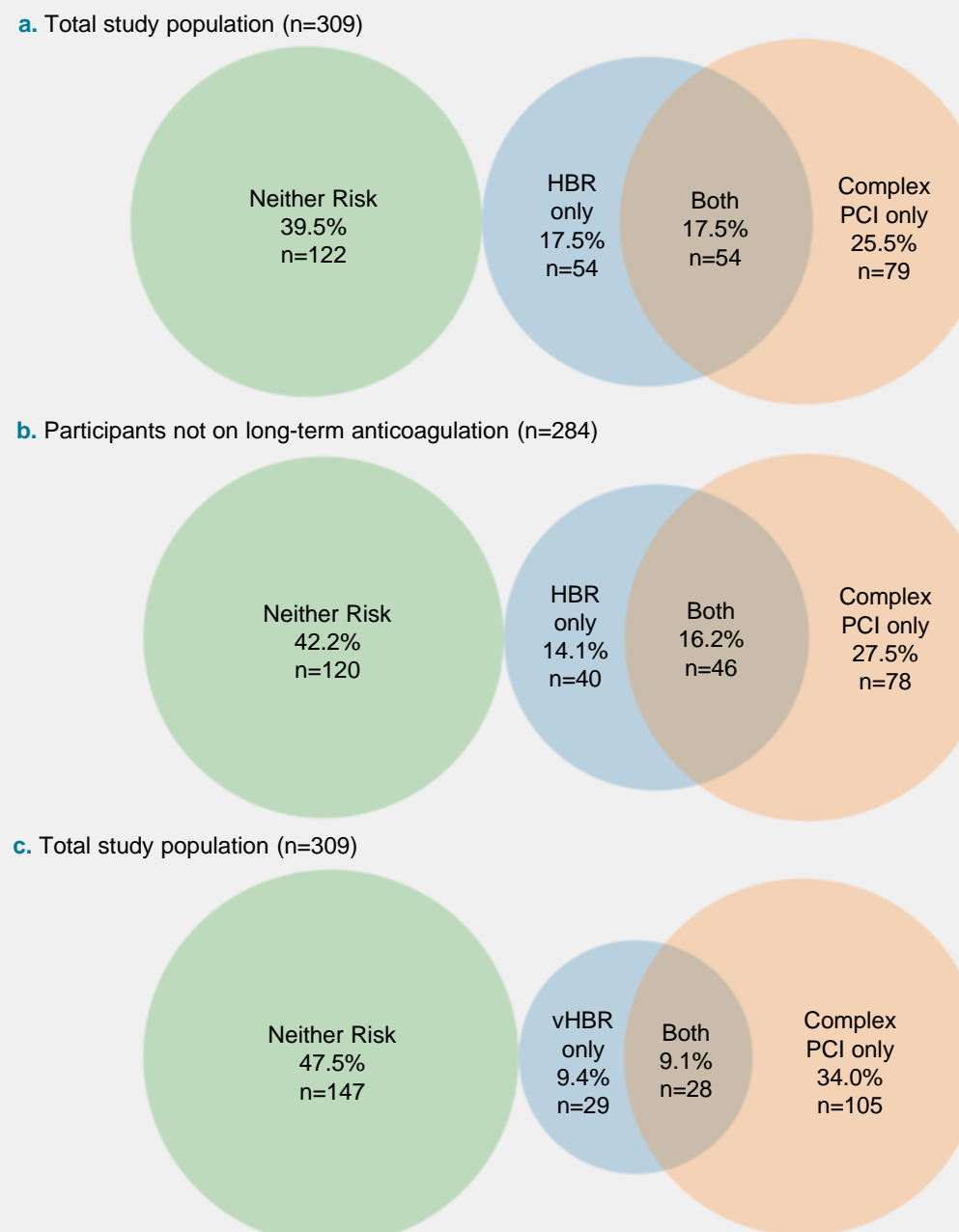
**PRECISE-HBR components** most strongly differentiating HBR vs non-HBR:

- Older age (79.5 vs 64 years)
- Lower hemoglobin (125 vs 149 g/L)
- Lower renal function (eGFR 67.8 vs 85.7 mL/min/1.73 m<sup>2</sup>)
- Long-term anticoagulation use (20.4% vs 1.5%)

**Most prevalent complex PCI criteria:**

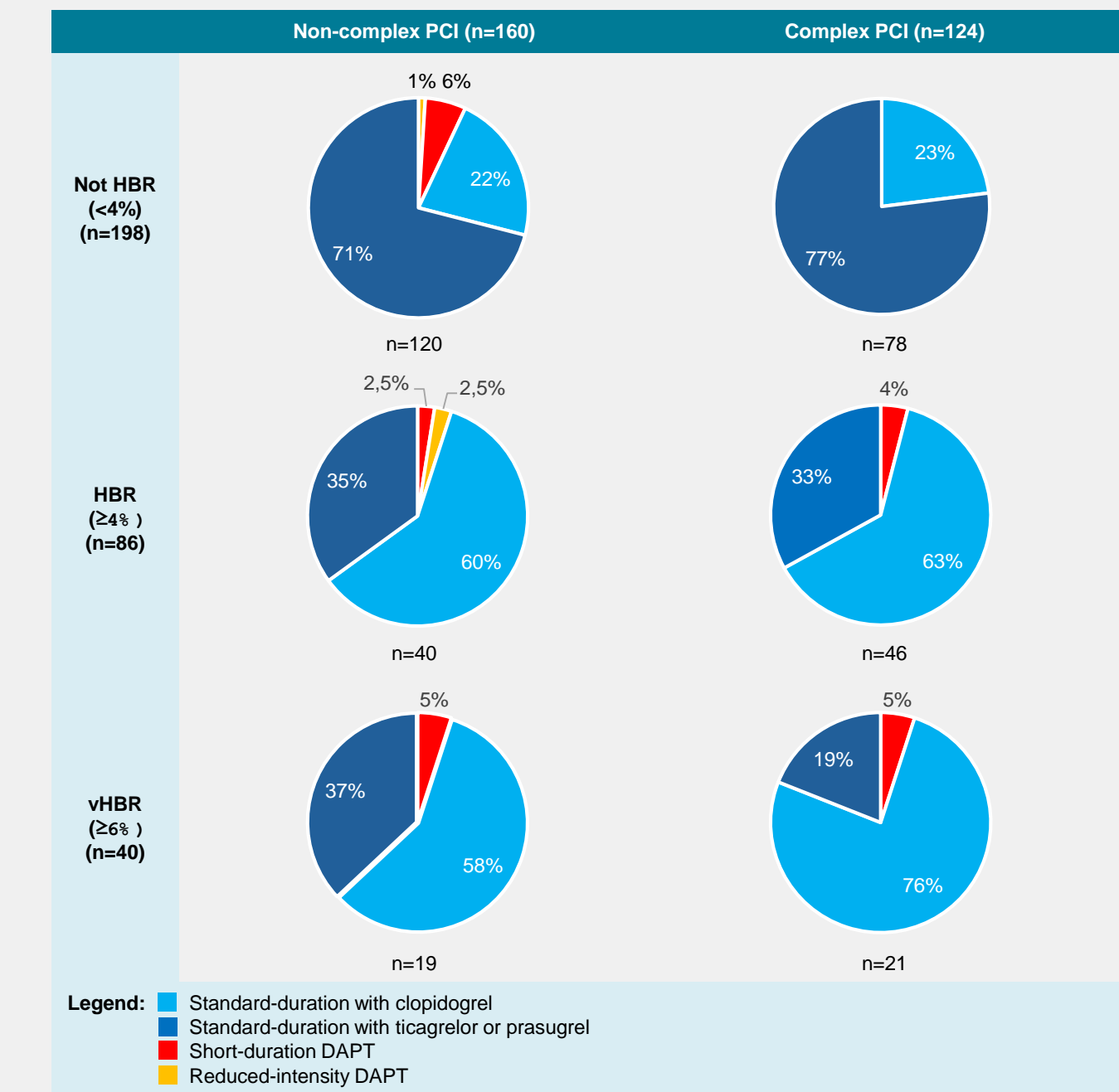
- ≥3 lesions treated (63.2%)
- Total stent length ≥60 mm (61.7%)
- ≥3 stents implanted (53.4%)

**Figure 1.** Proportional Overlap Between High Bleeding Risk and Complex PCI



**Legend:** Three Venn diagrams illustrate the overlap between HBR and complex PCI in the study population. Circle areas are proportional to the number of patients in each category. **Panel A** depicts the overall cohort using an HBR definition of PRECISE-HBR ≥4%. **Panel B** shows the same analysis restricted to patients not receiving long-term oral anticoagulation. **Panel C** presents the overall cohort using a very high bleeding risk (vHBR) definition of PRECISE-HBR ≥6%.

**Figure 2.** Prescribed DAPT strategies by bleeding risk and presence of complex PCI in participants not on long-term anticoagulation



**Abbreviations:** DAPT = dual antiplatelet therapy; HBR = high bleeding risk; PCI = percutaneous coronary intervention; vHBR = very high bleeding risk

## 5 Conclusion

- Nearly one in six patients undergoing PCI for ACS met both HBR and complex PCI criteria.
- In this real-world setting, clinicians appeared to favor standard-duration clopidogrel-based DAPT rather than de-escalation approaches.
- These findings underscore the need for clearer evidence and practical guidance to support individualized antiplatelet decision-making in patients with competing bleeding and ischemic risks.

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