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Real-world use of abbreviated dual antiplatelet therapy after percutaneous coronary intervention among patients with high bleeding risk: Are guidelines followed? Insights from the FRANCE-PCI registry

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ABSTRACT

Background: Dual antiplatelet therapy reduces ischaemic complications after percutaneous coronary intervention, but increases bleeding risk, especially in patients who are already at high bleeding risk. Current guidelines therefore recommend abbreviated dual antiplatelet therapy in this population.
Aim: To evaluate the real-world use of abbreviated dual antiplatelet therapy (≤ 3 months) after percutaneous coronary intervention according to bleeding risk, using data from the nationwide FRANCE-PCI registry.
Methods: All consecutive patients undergoing percutaneous coronary intervention for either acute or chronic coronary syndrome between 2014 and 2023 across 56 hospitals, who were alive at 1 year, and in whom dual antiplatelet therapy duration was known, were included. High bleeding risk was defined as the presence of at least one of the following: age ≥ 75 years; chronic oral anticoagulant therapy; previous stroke; or chronic kidney disease.

Abbreviations: ACS, acute coronary syndrome; ARC-HBR, Academic Research Consortium for High Bleeding Risk; CCS, chronic coronary syndrome; CI, confidence interval; DAPT, dual antiplatelet therapy; HBR, high bleeding risk; HR, hazard ratio; OR, odds ratio; PCI, percutaneous coronary intervention.

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Results: Among 115,992 patients included, 41.4% met the criteria for high bleeding risk. Abbreviated dual antiplatelet therapy was prescribed in 23.1% of patients with a high bleeding risk versus 3.6% of patients without a high bleeding risk. Among patients with a high bleeding risk, factors independently associated with prolonged (> 3 months) dual antiplatelet therapy use were: increasing age (odds ratio [OR] 1.02, 95% confidence interval [CI] 1.02–1.03); female sex (OR 1.18, 95% CI 1.11–1.25); diabetes mellitus (OR 1.15, 95% CI 1.08–1.22); previous stroke (OR 1.54, 95% CI 1.39–1.69); chronic kidney disease (OR 1.24, 95% CI 1.15–1.34); acute coronary syndrome (OR 1.52, 95% CI 1.44–1.61); and stent length ≥ 60 mm (OR 1.18, 95% CI 1.09–1.28).
Conclusions: In real-word practice, less than one third of patients with a high bleeding risk received abbreviated dual antiplatelet therapy after percutaneous coronary intervention. The use of prolonged dual antiplatelet therapy remained driven by ischaemic risk markers, highlighting persistent uncertainty in bleeding risk/ischaemic risk trade-offs.

1. Background

Dual antiplatelet therapy (DAPT) is the cornerstone of secondary prevention after percutaneous coronary intervention (PCI), effectively reducing the risk of stent thrombosis and recurrent ischaemic events [1–4]. However, prolonged DAPT increases the likelihood of bleeding complications, which can offset its ischaemic benefits, particularly among patients who are already at high bleeding risk (HBR) [5–8]. As the PCI population ages and co-morbidities, such as chronic kidney disease, previous stroke and concomitant anticoagulation, become more prevalent, managing this delicate balance between ischaemic and bleeding risks has become increasingly complex.

In recent years, multiple randomized controlled trials have demonstrated that abbreviating DAPT to 1–3 months, followed by single antiplatelet therapy, significantly lowers bleeding rates, without a parallel rise in ischaemic events [9–12]. Previous studies have provided strong evidence supporting the safety of this approach in selected patients, particularly those with HBR treated with contemporary drug-eluting stents [13–18]. These findings have been incorporated into recent guidelines, which now recommend individualizing DAPT duration according to both ischaemic and bleeding profiles [1–4].

Despite these advances, implementing guideline-directed DAPT strategies in everyday clinical practice remains challenging. Real-world adherence to abbreviated DAPT regimens appears limited, and data on their effectiveness and safety outside controlled trial settings are still scare. Concerns regarding stent thrombosis or incomplete revascularization may discourage clinicians from shortening antiplatelet therapy, especially in patient with complex coronary lesions, acute coronary syndrome (ACS) or high-risk procedural features, such as long total stent length. Patient-related factors, including chronic kidney disease and diabetes mellitus, further contribute to increased ischaemic risk [2,3].

The present analysis, based on the nationwide FRANCE-PCI registry, aimed to evaluate real-world DAPT durations after PCI for either ACS or chronic coronary syndrome (CCS) according to bleeding risk, and to define the predictors of prolonged (> 3 months) DAPT use among patients with HBR.

2. Methods

2.1. Study design and population

The FRANCE-PCI registry is a prospective multicentre nationwide registry that consecutively collects data on all patients undergoing PCI in 56 hospitals across France [19]. Each participating site prospectively records demographic, clinical, angiographic and procedural variables, together with in-hospital and follow-up outcomes, using a standardized electronic case report form. Clinical data were entered prospectively by investigators at the time of PCI. Follow-up was conducted at 1 year through outpatient visits, phone interviews or linkage with hospital electronic records.

For the present analysis, all consecutive patients undergoing PCI between January 2014 and June 2023 for either ACS or CCS were included. Patients were excluded if information on DAPT duration or 1-year follow-up was missing. Because DAPT duration was recorded retrospectively at the 1-year follow-up visit, patients who died before 1 year could not be reliably classified according to treatment duration, and were therefore excluded from the present analysis.

2.2. Definition of bleeding risk and treatment groups

HBR was defined as the presence of at least one of the following criteria: age ≥ 75 years; chronic use of oral anticoagulants; history of stroke; or chronic kidney disease [7]. This pragmatic definition does not fully correspond to the Academic Research Consortium for High Bleeding Risk (ARC-HBR) consensus definition, as some ARC-HBR variables were not systematically available in the registry.

Abbreviated DAPT was defined as ≤ 3 months after PCI, whereas prolonged DAPT was defined as > 3 months [12]. The decision regarding DAPT duration and choice of $P2Y_{12}$ inhibitor was left to the treating physician, according to clinical judgement and prevailing guidelines. DAPT duration was collected retrospectively at the 1-year follow-up visit.

2.3. Outcomes

During the 1-year follow-up, data regarding myocardial infarction, ischaemic stroke, major bleeding (Bleeding Academic Research Consortium type ≥ 3a) [20], in-stent thrombosis, target lesion revascularization and any revascularization were collected. Outcome analyses were exploratory and descriptive in nature, and were included solely to provide an overview of clinical event rates across study groups.

2.4. Statistical analysis

Statistical analyses were performed using Stata software, version 16 (StataCorp, College Station, TX, USA). All tests were two-sided, with an alpha level of 5%. Categorical data are presented as the number of patients and associated percentages, and quantitative data as mean ± standard deviation or median (25th; 75th percentiles), depending on their statistical distribution. The distribution of continuous variables was assessed by visual inspection of histograms and boxplots.

Comparisons between non-HBR and HBR populations were assessed using the χ^2 test or Fisher's exact test for categorical variables, and Student's *t*-test or the Mann-Whitney test for quantitative variables. Standardized mean differences were calculated to assess the magnitude of baseline differences between groups, with an absolute standardized mean difference > 0.10 considered clinically relevant.

Among patients with HBR, factors associated with prolonged DAPT use were studied using mixed-effects logistic regression models, with the centre included as a random effect. Variables associated with prolonged DAPT use in univariate analyses ($P < 0.05$) were entered into the multivariable model. Continuous variables were analysed as continuous measures without categorization. The results are expressed as odds ratio (ORs) and 95% confidence intervals (CIs). Missing data were

handled using complete case analysis; patients with missing values for variables included in the multivariable model were excluded from those analyses. The proportion of missing data for each variable included in the multivariable model is provided in Online supplement Table A.1.

Time-to-event data were estimated using the Kaplan-Meier method, and compared between groups (non-HBR versus HBR and DAPT ≤ 3 versus > 3 months) using Cox models, with the centre included as a random effect. The results are expressed as hazard ratios (HRs) and 95% CIs.

2.5. Ethics

The FRANCE-PCI registry was conducted in accordance with the principles of the Declaration of Helsinki. The study protocol was approved by an independent ethics committee, and registered with the French data protection authority (*Commission nationale de l'informatique et des libertés*). All participating centres obtained local approval before patient enrolment.

3. Results

3.1. Overall population

A total of 115,992 patients undergoing PCI between 2014 and 2023 were included in this analysis. The mean age was 68.0 ± 11.8 years, and 75.4% were male (Table 1). Approximately, half of the patients presented with a CCS (52.3%), 28.1% with a non-ST-segment elevation ACS and 19.0% with an ST-segment elevation myocardial infarction. Most procedures (92.9%) were performed via radial access, with a high rate of drug-eluting stent implantation (94.1%), and a PCI success rate of 97.6% (Online supplement Table A.2).

3.2. Characteristics by bleeding risk

A total of 48,028 (41.4%) patients fulfilled at least one HBR criterion. Compared with patients without HBR, the HBR group was substantially older (77.2 ± 8.9 vs. 61.4 ± 8.9 years) and more frequently female (30.3% vs. 20.5%; Table 1). Hypertension (69.9% vs. 49.8%) and diabetes mellitus (29.7% vs. 23.5) were more common in the HBR group; conversely, active smoking (9.0% vs. 31.1%) and a familial history of coronary artery disease (14.9% vs. 27.0%) were less frequent. At presentation, patients with HBR were more often admitted with CCS (58.8% vs. 47.7%), and less often with ST-segment elevation myocardial infarction (13.2% vs. 23.1%).

Procedural characteristics also differed (Online supplement Table A.2) – radial access was less frequent (90.9% vs. 94.3%) and multivessel disease was more prevalent (26.9% vs. 20.6%). Total stent length and the number of lesions treated were higher in the HBR group, whereas overall PCI success rates were similar (97.5% vs. 97.6%).

3.3. Determinants of DAPT duration among patients with HBR

Abbreviated DAPT (≤ 3 months) was prescribed in 23.1% (95% CI 22.7–23.5) of patients with HBR, and in only 3.6% of patients without HBR ($P < 0.001$). Nearly three quarters of the HBR group remained on prolonged DAPT beyond 3 months (Fig. 1). Across the entire study period, abbreviated DAPT was consistently more frequently prescribed in patients with HBR than in those without HBR (Online supplement Fig. A.1). Over time, the proportion of patients in the HBR group receiving abbreviated DAPT progressively increased, whereas it remained stable in the non-HBR group. In parallel, a gradual shift towards shorter DAPT durations was observed in both groups, reflected by a progressive reduction in > 12 months of DAPT use over the study period.

Within the HBR group, several clinical and angiographic characteristics were independently associated with the prescription of prolonged DAPT (Table 2). Increasing age was associated with longer treatment duration, with an adjusted OR of 1.02 (95% CI 1.02–1.03). Other significant predictors were female sex (OR 1.18, 95% CI 1.11–1.25), diabetes mellitus (OR 1.15, 95% CI 1.08–1.22), previous stroke (OR 1.54, 95% CI 1.39–1.69), chronic kidney disease (OR 1.24, 95% CI 1.15–1.34) and ACS presentation (OR 1.52, 95% CI 1.44–1.61). Procedural characteristics also influenced treatment duration, with a total stent length ≥ 60 mm being independently associated with prolonged DAPT (OR 1.18, 95% CI 1.09–1.28).

3.4. Clinical outcomes

At 1 year, patients with HBR had higher rates of major bleeding (2.5% vs. 1.1%; HR 2.26, 95% CI 2.05–2.50) compared with patients without HBR (Online supplement Table A.3); patients with HBR also had higher rates of ischaemic stroke (0.8% vs. 0.3%; HR 2.83, 95% CI 2.44–3.28) and target lesion revascularization (1.8% vs. 1.5%; HR 1.26, 95% CI 1.11–1.43).

Among the HBR group, prolonged DAPT was associated with a significantly lower risk of major bleeding (HR 0.56, 95% CI 0.50–0.64; Online supplement Table A.4), along with a higher risk of myocardial infarction (HR 1.32, 95% CI 1.05–1.67), target lesion revascularization (HR 1.60, 95% CI 1.29–1.99) and any revascularization (HR 1.40, 95% CI 1.16–1.70).

4. Discussion

In this large nationwide registry of PCI procedures, over 40% of patients fulfilled at least one HBR criterion. Despite their increased bleeding risk, only one in four patients with HBR received abbreviated DAPT, whereas prolonged DAPT remained the dominant approach. Importantly, treatment duration appeared largely driven by markers of ischaemic risk. Together, these findings highlight a substantial gap between current guideline recommendations and real-world clinical practice.

4.1. Prevalence and characteristics of patients with HBR

The proportion of patients with HBR observed in the present study was consistent with previous registries, such as SWEADHEART and PARIS, in which 35–45% of PCI populations met HBR criteria [21–23]. However, these studies relied on broader and partially different HBR definitions, which may account for some variability in patient classification.

In our study, patients with HBR were markedly older, more often female and carried heavier co-morbidity burdens, including hypertension, diabetes mellitus, stroke and renal dysfunction, compared with patients without HBR, confirming their dual susceptibility to both ischaemic and bleeding events; they also presented more frequently with CCSs and multivessel disease, emphasizing that HBR frequently coexists with procedural and anatomical complexity.

4.2. Limited adoption of abbreviated DAPT

Although recent trials have demonstrated that abbreviated DAPT can safely reduce bleeding in patients with HBR, its implementation in daily practice remains modest [11,12,14,22]. In our study, only 23.1% of the HBR group were treated with DAPT ≤ 3 months, and 8.5% with DAPT < 1 month. Several factors may explain this conservative behaviour. Physicians may underestimate bleeding risk, overestimate ischaemic risk or feel constrained by entrenched habits favouring 6- or 12-month therapy, according to clinical presentation. In addition, clinical and procedural complexity, such as ACS presentation or long total stent length, often leads to caution and prolongation of therapy. Our multivariable analysis confirmed that these factors, together with age, female sex, diabetes mellitus, chronic kidney disease and previous stroke, were independently associated with longer DAPT duration.

Table 1
Baseline patient characteristics.

	Overall population	Non-HBR population	HBR population	SMD
	(n = 115,992)	(n = 67,964)	(n = 48,028)	
Characteristics				
Age (years)	68.0 ± 11.8	61.4 ± 8.9	77.2 ± 8.9	1.78
Body mass index (kg/m^2)	27.4 ± 4.7	27.7 ± 4.8	27.1 ± 4.6	0.13
Male sex	87,472/115,962 (75.4)	54,022/67,940 (79.5)	33,450/48,022 (69.7)	0.23
Medical history				
Hypertension	67,127/115,431 (58.2)	33,666/67,566 (49.8)	33,461/47,865 (69.9)	0.42
Diabetes mellitus	30,095/115,404 (26.1)	15,899/67,532 (23.5)	14,196/47,872 (29.7)	0.14
Hypercholesterolaemia[a]	57,436/112,690 (51.0)	32,243/65,863 (49.0)	25,193/46,827 (53.8)	0.10
Current smoker	25,336/115,583 (21.9)	21,049/67,744 (31.1)	4,287/47,839 (9.0)	0.57
Family history of CAD	25,055/113,842 (22.0)	18,028/66,668 (27.0)	7,027/47,174 (14.9)	0.30
Previous myocardial infarction	11,195/115,667 (9.7)	6,183/67,792 (9.1)	5,012/47,875 (10.5)	0.05
Previous PCI	25,048/115,891 (21.6)	13,069/67,901 (19.2)	11,979/47,990 (25.0)	0.14
Previous CABG	4,838/115,909 (4.2)	2,078/67,905 (3.1)	2,760/48,004 (5.7)	0.13
Previous stroke	4,677/115,820 (4.0)	0/67,857 (0)	4,677/47,963 (9.8)	0.46
Peripheral arterial disease	9,830/115,355 (8.5)	4,295/67,550 (6.4)	5,535/47,805 (11.6)	0.18
Chronic kidney disease[b]	8,185/114,274 (7.2)	0/66,739 (0)	8,185/47,535 (17.2)	0.64
Clinical presentation				
Indication				0.29
CCS	60,683 (52.3)	32,451 (47.7)	28,232 (58.8)	
STEMI	22,003 (19.0)	15,685 (23.1)	6,318 (13.2)	
NSTE-ACS	32,624 (28.1)	19,353 (28.5)	13,271 (27.6)	
Cardiac arrest	547 (0.5)	409 (0.6)	138 (0.3)	
Cardiogenic shock	135 (0.1)	66 (0.1)	69 (0.1)	
Glycated haemoglobin (%) (n = 3,514)	7.0 (6.4; 7.9)	7.1 (6.4; 8.0)	7.0 (6.3; 7.8)	0.19
LDL cholesterol (g/L) (n = 17,453)	1.05 (0.73; 1.39)	1.13 (0.79; 1.45)	0.94 (0.67; 1.27)	0.33
LVEF				0.22
> 50%	64,180/83,334 (77.0)	38,638/47,781 (80.9)	25,542/35,553 (71.8)	
30–50%	16,523/83,334 (19.8)	8,114/47,781 (17.0)	8,409/35,553 (23.7)	
< 30%	2,631/83,334 (3.2)	1,029/47,781 (2.2)	1,602/35,553 (4.5)	

CABG: coronary artery bypass graft; CAD: coronary artery disease; CCS: chronic coronary syndrome; HBR: high bleeding risk; LDL: low-density lipoprotein; LVEF: left ventricular ejection fraction; NSTE-ACS: non-ST-segment elevation acute coronary syndrome; PCI: percutaneous coronary intervention; SMD: standardized mean difference (in absolute value); STEMI: ST-segment elevation myocardial infarction. Data are expressed as mean ± standard deviation, number of patients (%) or median (25th; 75th percentiles). In the first column, n is the number of patients with available data if there are missing data. P-values were < 0.001 for all variables.

[a] Patients described as having hypercholesterolaemia were either receiving treatment with cholesterol-lowering medications or were known to have elevated cholesterol concentrations (> 200 mg/dL or > 5.2 mmol/L).

[b] Patients reported as having a clinical history of chronic kidney disease.

Multiple randomized controlled trials have demonstrated that DAPT durations of 1–3 months followed by single antiplatelet therapy substantially reduce bleeding without increasing ischaemic events [12,17,24–26]. In contrast, in the present study, higher bleeding rates were observed among patients receiving abbreviated DAPT compared with prolonged DAPT, without any excess in ischaemic events. This apparent discrepancy likely reflects confounding by indication, as clinicians may have preferentially shortened therapy in the most fragile or bleeding-prone patients. In addition, randomized trials enrolled highly selected patients, frequently excluded the frailest individuals and applied rigorous follow-up protocols, whereas our registry reflects unselected real-world populations managed by diverse operators. Accordingly, our findings should not be interpreted as evidence against the safety of abbreviated DAPT, but rather as a mirror of the challenges in translating trial evidence into routine clinical practice.

4.3. Determinants of prolonged therapy

Clinical factors such as older age, female sex, diabetes mellitus and chronic kidney disease were independently associated with prolonged DAPT, despite being well-recognized predictors of bleeding risk. These variables are also established markers of ischaemic vulnerability, which likely accounts for clinicians favouring longer DAPT durations in this population, reflecting the inherent complexity of balancing competing risks in real-world practice [27,28].

Beyond clinical frailty, procedural factors heavily influenced DAPT duration. ACS presentation and total stent length ≥ 60 mm were among the strongest predictors of prolonged DAPT. Such decisions illustrate that interventional cardiologists still primarily weigh ischaemic complexity rather than bleeding risk when determining therapy length. Although understandable, this approach conflicts with the current European Society of Cardiology recommendations advocating for a patient-tailored balance [2–4]. Importantly, even within the HBR group, over 75% received prolonged DAPT, showing that recognition of bleeding risk alone does not systematically modify behaviour. Future studies with more comprehensive ischaemic and bleeding risk profiling should evaluate the respective and combined contributions of these competing risks to DAPT duration decisions, providing a more granular understanding of real-world prescribing behaviour beyond the HBR framework alone.

4.4. Clinical implications

Current European guidelines recommend 1–3 months of DAPT followed by single antiplatelet therapy in patients with HBR, provided that new-generation drug-eluting stents are used and the procedure is uncomplicated [2–4]. The persistence of prolonged DAPT in our registry suggests that guideline penetration remains incomplete. Wider adoption of structured bleeding-risk assessment tools, such as ARC-HBR or PRECISE-DAPT, could facilitate identification of suitable candidates for

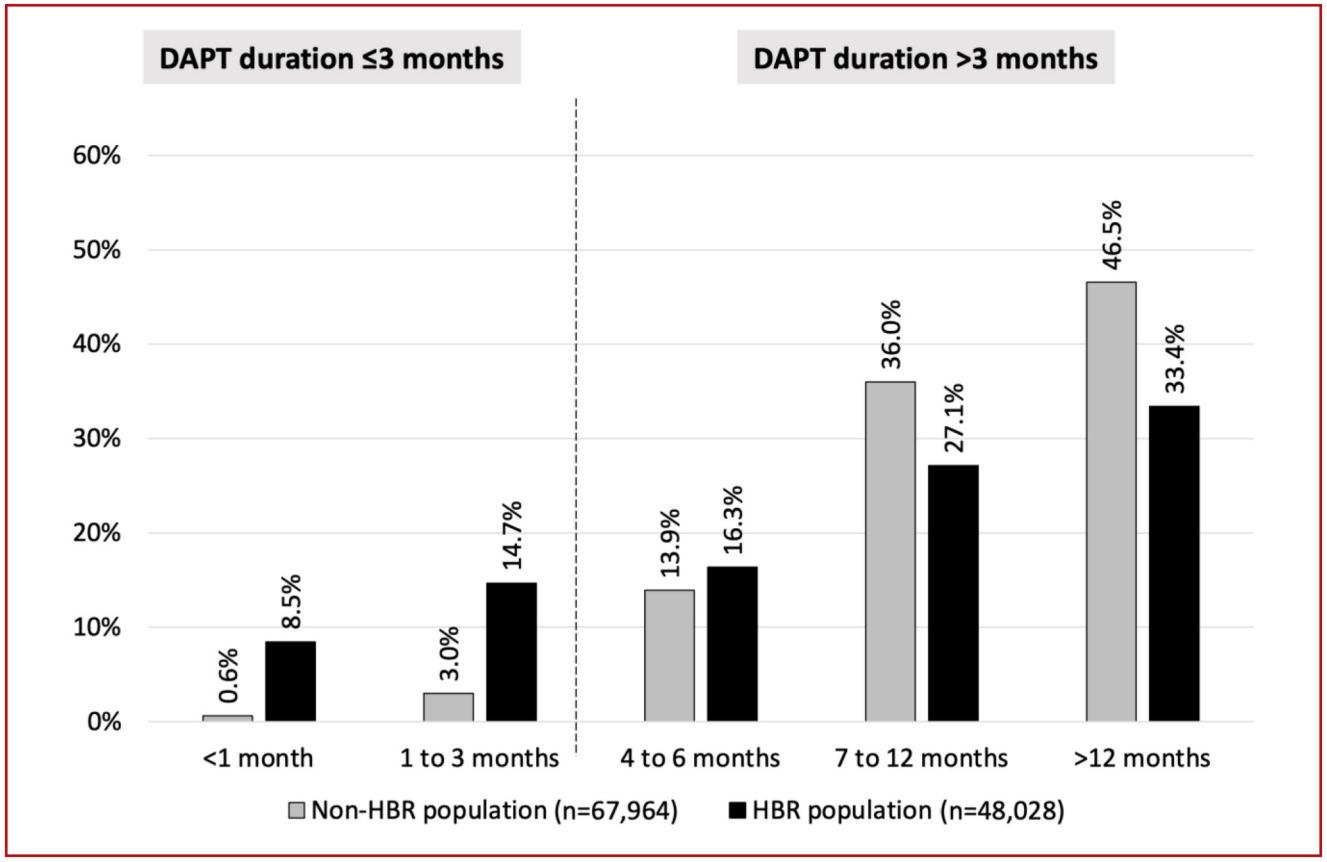


Fig. 1. Duration of dual antiplatelet therapy (DAPT) after percutaneous coronary intervention, according to bleeding risk. Bars represent the distribution of patients with high bleeding risk (HBR) (black bars) and those without HBR (grey bars), according to DAPT duration. Patients with HBR were more likely to receive abbreviated DAPT (≤ 3 months), whereas patients without HBR were more likely to continue DAPT for longer periods (> 3 months).

abbreviated regimens [29–31]. At the same time, our findings emphasize the need for precise patient selection. Not all patients with HBR benefit from shorter therapy; those with complex anatomy, incomplete revascularization or very high ischaemic risk may still require extended DAPT despite bleeding concerns [32].

The message from our study is therefore not that abbreviated DAPT is unsafe, but that patient selection for shorter DAPT durations remains challenging in real-world practice. Early discontinuation of DAPT should be reserved for those with a clearly predominant bleeding risk and stable coronary anatomy. Integration of risk scores and decision-support algorithms into clinical practice could help to reconcile these competing objectives. Moreover, routine use of radial access, high-performance drug-eluting stents and intravascular imaging may further reduce ischaemic risk, allowing safer DAPT de-escalation in appropriate patients.

From a health-economic perspective, wider implementation of abbreviated DAPT strategies in appropriately selected patients could contribute to cost savings by limiting medication use and management of bleeding complications.

4.5. Study limitations

This study has inherent limitations. Its observational design precludes causal inference, and residual confounding is inevitable. The retrospective collection of DAPT duration at 1 year may have led to reverse causality, as early bleeding events resulting in premature DAPT discontinuation were subsequently classified in the abbreviated DAPT group. Consequently, patients who discontinued therapy early because of a bleeding complication could not be distinguished from those managed with a planned abbreviated strategy, which may have contributed to the higher bleeding rates observed in the abbreviated DAPT group, and should be interpreted with caution. DAPT duration was not randomized, and unmeasured variables, such as frailty, anaemia and physician preference, may have influenced treatment allocation. Moreover, excluding patients who died before 1 year may have introduced a survival bias; however, this approach was necessary because the exact duration of DAPT could not be determined in these patients. As a result, although vital status was available, mortality could not be reliably analysed in relation to DAPT duration in this study. Our definition of HBR relied on a limited number of variables available in the registry, and therefore did not fully match the ARC-HBR consensus definition. This simplified approach may have led to some misclassification of bleeding risk. However, the proportion of patients with HBR observed in our cohort (41.4%) is consistent with that reported in previous large registries and clinical trials, supporting the external validity of our findings. Moreover, similar pragmatic adaptations of the ARC-HBR definition have also been used in other large nationwide registries, such as SWEDEHEART, reflecting the inherent constraints of real-world observational databases [33]. Detailed data on the specific monotherapy chosen after DAPT cessation, medication adherence and reasons for discontinuation were unavailable. Furthermore, the FRANCE-PCI registry is based on the voluntary participation of 56 centres, and captures an estimated 10–15% of all PCI procedures performed annually in France, which may limit the generalizability of our findings to the overall national PCI population. Finally, follow-up was limited to 1 year, and late events beyond this timeframe were not captured.

Table 2
Factors associated with prolonged dual antiplatelet therapy among patients with a high bleeding risk.

	n	DAPT ≤ 3 months	DAPT > 3 months	Univariate (*n* = 48,028)		Multivariable (*n* = 32,827)	
				OR (95% CI)	*P*	OR (95% CI)	*P*
Characteristics							
Age (years)	48,027	75.7 ± 9.5	77.7 ± 8.6	1.02 (1.01–1.03)	< 0.001	1.02 (1.02–1.03)	< 0.001
Age category (years)							
< 60	2,446	701 (28.7)	1,745 (71.3)	Ref.		–	–
60–74	9,423	3,620 (38.4)	5,803 (61.6)	0.63 (0.57–0.69)	< 0.001	–	–
75–84	27,387	4,830 (17.6)	22,557 (82.4)	1.90 (1.73–2.09)	< 0.001	–	–
≥ 85	8,771	1,952 (22.3)	6,819 (77.7)	1.46 (1.31–1.62)	< 0.001	–	–
Sex							
Male	33,450	8,208 (24.5)	25,242 (75.5)	Ref.		Ref.	
Female	14,572	2,895 (19.9)	11,677 (80.1)	1.32 (1.26–1.38)	< 0.001	1.18 (1.11–1.25)	< 0.001
Body mass index (kg/m^2)	47,843	27.7 ± 5.0	26.9 ± 4.5	0.96 (0.96–0.97)	< 0.001	0.97 (0.96–0.98)	< 0.001
Medical history							
Hypertension							
No	14,404	3,411 (23.7)	10,993 (76.3)	Ref.		Ref.	
Yes	33,461	7,656 (22.9)	25,805 (77.1)	1.03 (0.99–1.08)	0.18	0.93 (0.87–0.99)	0.02
Diabetes mellitus							
No	33,676	7,923 (23.5)	25,753 (76.5)	Ref.		Ref.	
Yes	14,196	3,143 (22.1)	11,053 (77.9)	1.05 (1.00–1.10)	0.05	1.15 (1.08–1.22)	< 0.001
Hypercholesterolaemia[a]							
No	21,634	5,164 (23.9)	16,470 (76.1)	Ref.		Ref.	
Yes	25,193	5,628 (22.3)	19,565 (77.7)	1.08 (1.03–1.13)	0.001	1.14 (1.08–1.21)	< 0.001
Current smoker							
No	43,552	9,953 (22.9)	33,599 (77.1)	Ref.		Ref.	
Yes	4,287	1,107 (25.8)	3,180 (74.2)	0.83 (0.77–0.90)	< 0.001	1.07 (0.97–1.19)	0.19
Family history of CAD							
No	40,147	9,338 (23.3)	30,809 (76.7)	Ref.		Ref.	
Yes	7,027	1,573 (22.4)	5,454 (77.6)	1.05 (0.98–1.11)	0.16	1.10 (1.02–1.19)	0.01
Previous myocardial infarction							
No	42,863	9,831 (22.9)	33,032 (77.1)	Ref.		Ref.	
Yes	5,012	1,237 (24.7)	3,775 (75.3)	0.85 (0.79–0.91)	< 0.001	0.94 (0.86–1.02)	0.16
Previous PCI							
No	36,011	8,296 (23.0)	27,715 (77.0)	Ref.		–	–
Yes	11,979	2,795 (23.3)	9,184 (76.7)	0.95 (0.90–0.99)	0.048	–	–
Previous CABG							
No	45,244	10,401 (23.0)	34,843 (77.0)	Ref.		Ref.	
Yes	2,760	697 (25.3)	2,063 (74.7)	0.87 (0.79–0.95)	0.002	0.85 (0.76–0.96)	0.006
Previous stroke							
No	43,286	10,201 (23.6)	33,085 (76.4)	Ref.		Ref.	
Yes	4,677	889 (19.0)	3,788 (81.0)	1.26 (1.16–1.36)	< 0.001	1.54 (1.39–1.69)	< 0.001
Peripheral arterial disease							
No	42,270	9,855 (23.3)	32,415 (76.7)	Ref.		Ref.	
Yes	5,535	1,193 (21.6)	4,342 (78.4)	1.02 (0.95–1.09)	0.66	0.98 (0.90–1.06)	0.57
Chronic kidney disease[b]							
No	39,350	9,279 (23.6)	30,071 (76.4)	Ref.		Ref.	
Yes	8,185	1,724 (21.1)	6,461 (78.9)	1.13 (1.06–1.20)	< 0.001	1.24 (1.15–1.34)	< 0.001
Clinical presentation							
Indication							
CCS	28,232	7,249 (25.7)	20,983 (74.3)	Ref.		Ref.	
ACS	19,589	3,792 (19.4)	15,797 (80.6)	1.50 (1.43–1.57)	< 0.001	1.52 (1.44–1.61)	< 0.001
LVEF							
> 50%	25,542	5,444 (21.3)	20,098 (78.7)	Ref.		Ref.	
30–50%	8,409	2,186 (26.0)	6,223 (74.0)	0.75 (0.71–0.80)	< 0.001	0.71 (0.66–0.75)	< 0.001
< 30%	1,602	582 (36.3)	1,020 (63.7)	0.46 (0.41–0.51)	< 0.001	0.48 (0.42–0.54)	< 0.001
Procedural data							
Coronary artery extent							
No significant lesion	3,004	670 (22.3)	2,334 (77.7)	Ref.		Ref.	
One-vessel disease	15,749	4,009 (25.5)	11,740 (74.5)	1.02 (0.90–1.15)	0.80	0.93 (0.78–1.12)	0.46
Two-vessel disease	15,847	3,566 (22.5)	12,281 (77.5)	1.18 (1.04–1.35)	0.01	1.02 (0.85–1.22)	0.84
Three-vessel disease	12,921	2,731 (21.1)	10,190 (78.9)	1.29 (1.13–1.47)	< 0.001	1.10 (0.91–1.32)	0.34
Left main coronary artery	493	127 (25.8)	366 (74.2)	1.18 (0.93–1.51)	0.17	0.90 (0.62–1.31)	0.59
Total length of stent							
< 60 mm	36,798	8,625 (23.4)	28,173 (76.6)	Ref.		Ref.	
≥ 60 mm	8,984	1,836 (20.4)	7,148 (79.6)	1.19 (1.13–1.26)	< 0.001	1.18 (1.09–1.28)	< 0.001

Table 1 (*Continued*)

	n	DAPT ≤ 3 months	DAPT > 3 months	Univariate (*n* = 48,028)		Multivariable (*n* = 32,827)	
				OR (95% CI)	*P*	OR (95% CI)	*P*
Number of PCIs							
< 3	41,490	9,705 (23.4)	31,785 (76.6)	Ref.		–	–
≥ 3	6,538	1,398 (21.4)	5,140 (78.6)	1.09 (1.02–1.16)	0.01	–	–
Number of stents							
< 3	41,135	9,621 (23.4)	31,514 (76.6)	Ref.		Ref.	
≥ 3	6,893	1,482 (21.5)	5,411 (78.5)	1.12 (1.05–1.20)	< 0.001	1.04 (0.95–1.14)	0.42

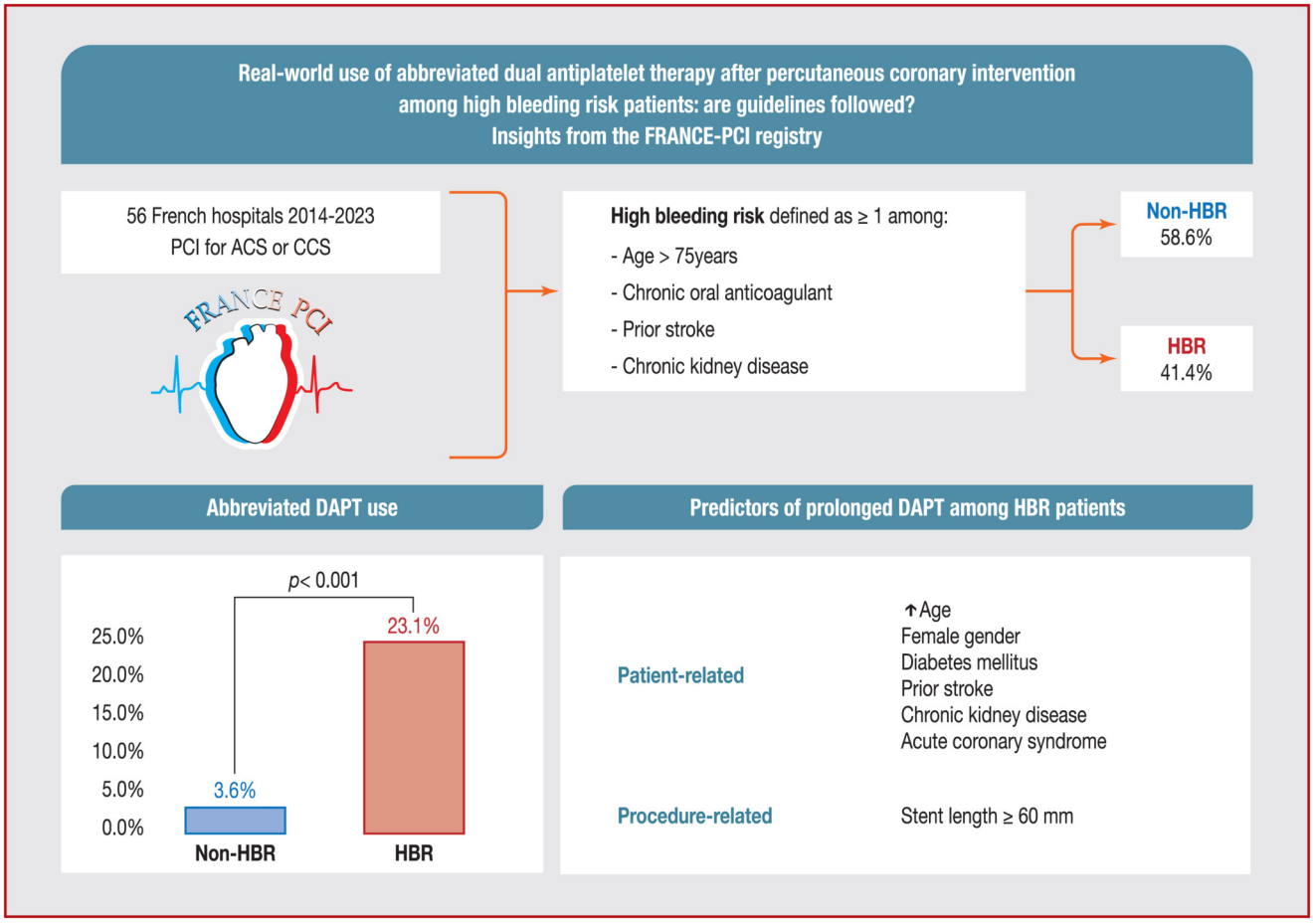
ACS: acute coronary syndrome; CABG: coronary artery bypass graft; CAD: coronary artery disease; CCS: chronic coronary syndrome; CI: confidence interval; DAPT: dual antiplatelet therapy; LVEF: left ventricular ejection fraction; OR: odds ratio; PCI: percutaneous coronary intervention. Data are expressed as mean ± standard deviation or number of patients (%).

[a] Patients described as having hypercholesterolaemia were either receiving treatment with cholesterol-lowering medications or were known to have elevated cholesterol concentrations (> 200 mg/dL or > 5.2 mmol/L).

[b] Patients reported as having a clinical history of chronic kidney disease.

5. Conclusions

In a contemporary national PCI registry, 41.4% of patients met HBR criteria. Despite guideline recommendations, fewer than 30% of patients with HBR received abbreviated DAPT. Clinical and procedural complexity strongly influenced treatment duration, revealing persistent reliance on ischaemic risk rather than bleeding risk in decision-making. These findings underscore the need for a structured evidence-based approach to personalize DAPT duration and narrow the gap between clinical trials and everyday practice (Central illustration).



Central illustration. Real-world use of abbreviated dual antiplatelet therapy (DAPT) after percutaneous coronary intervention (PCI) in patients at high bleeding risk (HBR). Among 115,992 patients undergoing PCI in 56 French hospitals between 2014 and 2023, 41.4% met HBR criteria (age ≥ 75 years, chronic oral anticoagulation, previous stroke or chronic kidney disease). Despite guideline recommendations supporting abbreviated DAPT (≤ 3 months) in patients with HBR, only 23.1% received shortened therapy compared with 3.6% of patients without HBR. Prolonged DAPT remained mainly driven by ischaemic and procedural complexity. These findings highlight a gap between guideline recommendations and real-world clinical practice. ACS: acute coronary syndrome; CCS: chronic coronary syndrome.

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Disclosure of interest

The authors declare that they have no competing interest.

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Online supplement. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.acvd.2026.06.003.

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