

Clinical Decision Tool Reviews

Review of Predicting Bleeding Complications in Patients Undergoing Stent Implantation and Subsequent Dual Antiplatelet Therapy Score

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Abstract

The PRECISE-DAPT score is a validated five-item tool (age, creatinine clearance, hemoglobin, white blood cell count, and prior bleeding) designed to estimate bleeding risk in patients on dual antiplatelet therapy (DAPT) after PCI. Derived from pooled randomized trial data, it helps identify patients at high bleeding risk (score ≥ 25) who may derive greater net benefit from shorter DAPT (3–6 months) versus those at lower risk suitable for standard or extended therapy. Multiple external validations demonstrate moderate discrimination (AUC/C-statistic ~ 0.61 – 0.75) across different populations types. The PRECISE-DAPT score remains a practical, evidence-based tool to aid in clinical risk-benefit evaluation for DAPT duration after PCI.

I. HOW TO USE

When to Use

Use the PRECISE-DAPT Score at the time of PCI or hospital discharge to estimate a patient's bleeding risk during dual antiplatelet therapy (DAPT). It helps determine whether a shorter (3–6 month) versus standard or longer (≥ 12 month) DAPT duration is more appropriate based on bleeding risk. Applicable to patients receiving aspirin plus a P2Y12 inhibitor and not on oral anticoagulation.

Pearls / Pitfalls

The score applies to patients receiving aspirin plus a P2Y12 inhibitor (primarily studied among patients taking clopidogrel though some data on other P2Y12 inhibitors) and not on chronic anticoagulation. A simplified 4-item version was also created for if WBC is unavailable.

- Derived primarily from patients on aspirin + clopidogrel; performance in derivation cohort was similar in patients with ticagrelor but lower in patients with prasugrel.
- The score can be applied at PCI or discharge to help inform risk-benefit of DAPT duration — ≥ 25 = high bleeding risk, favor shorter (3–6 months).
- Designed for out-of-hospital bleeding prediction, not in-hospital or procedural bleeding.

- Moderate discrimination; should complement, not replace, clinical judgment.
- Not validated in patients on triple therapy (OAC + DAPT), post-CABG, or those with very low hemoglobin/CrCl outside trial populations.
- Discrimination of the score without WBC was similar to overall results in PLATO but lower in Bern-PCI
- Combine with an ischemic-risk tool (e.g., DAPT Score) for further decision-making.

Why to Use

DAPT duration after PCI requires balancing protection from stent thrombosis and ischemic events against bleeding risk. The PRECISE-DAPT Score offers an evidence-based, validated tool derived from over 14,000 patients, providing a simple, objective method to identify high-bleeding-risk patients who may benefit from shorter therapy and avoid unnecessary bleeding without compromising ischemic protection.

II. NEXT STEPS

Advice

Use the PRECISE-DAPT Score to add additional information to individualize DAPT duration after PCI by identifying patients at high bleeding risk (score ≥ 25) who may benefit from shorter therapy. Always interpret the result in context with the patient's ischemic risk, comor-

bilities, and frailty. The tool is best validated in patients treated with aspirin and clopidogrel. Avoid rigid cutoffs; instead, use the score to help weigh shared decision-making on DAPT duration, especially in borderline or elderly patients where bleeding risk often outweighs ischemic benefit. Additional risk scores for bleeding prediction such as [PRECISE-HBR](#) or [ABC-HBR](#) also exist and may be worth comparing PRECISE-DAPT with. The 2025 ACC/AHA guidelines for management of ACS recommend considering the [ABC-HBR score](#).

Management

For patients with a PRECISE-DAPT score ≥ 25 , consider short DAPT (3–6 months) if ischemic risk is low or bleeding risk is a concern, then transition to single antiplatelet therapy. For patients with a score < 25 , standard or extended DAPT may be reasonable, particularly if ischemic risk is high. Always individualize duration based on bleeding vs. ischemic risk, stent type, and presentation—some lower-bleeding-risk patients may still benefit from longer DAPT.

Critical Actions

- Reassess regularly if renal function, hemoglobin, or clinical status changes.
- Address reversible bleeding risks (e.g., treat anemia, discontinue unnecessary antithrombotics).
- Engage in shared decision-making with the patient, discussing the trade-off between bleeding and ischemic risk.
- Avoid over-reliance on the calculator in patients outside the derivation cohort (e.g., triple therapy).

III. EVIDENCE

Evidence Appraisal

Derivation & Validation Study

Derivation Study:

The PRECISE-DAPT score was derived and externally validated in a pooled individual-patient analysis of clinical trial datasets (Costa F, Klavren DV, James S et al. *Lancet*. 2017;389:1025–1034; [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)30397-5/abstract](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)30397-5/abstract)). There was no external funding.

The derivation cohort included 14,963 patients from eight PCI trials, with external validation in 8,595 patients from the PLATO trial and 6,172 patients from the Bern-PCI registry. Adults with coronary artery disease undergoing PCI with stent implantation and treated with dual

antiplatelet therapy (aspirin plus a P2Y₁₂ inhibitor, predominantly clopidogrel, 88%) were included if baseline clinical and laboratory data (age, hemoglobin, WBC, creatinine, prior bleeding) were available. Patients with indications for long-term oral anticoagulation, missing DAPT discharge data, or in-hospital bleeding were excluded; only out-of-hospital bleeding ≥ 7 days post-PCI was analyzed.

The endpoint was out-of-hospital TIMI major or minor bleeding. Discrimination was moderate, with C-statistics of 0.73 (95% CI 0.61–0.85) in derivation, 0.70 (0.65–0.74) in PLATO, and 0.66 (0.61–0.71) in Bern-PCI.

Strengths include a large, diverse dataset from eight RCTs, standardized bleeding definitions, external validation in randomized and real-world cohorts, and development of a simple five-variable bedside tool that demonstrated interaction with DAPT duration. Limitations include moderate discrimination (AUC ≈ 0.66 –0.73) and derivation mainly in clopidogrel-treated populations.

Additional Validations:

Additional studies have evaluated the performance of the PRECISE-DAPT score in external populations. In a post hoc analysis of the SMART-DATE randomized trial (Choi KH et al., *Circ Cardiovasc Interv*. 2020;13:e008530; <https://www.ahajournals.org/doi/10.1161/CIRCINTERVENTIONS.119.008530>), the score demonstrated moderate discrimination for major bleeding (AUC 0.75) in 2,712 patients with acute coronary syndromes undergoing PCI and identified patients who derived differential benefit from shorter versus longer DAPT durations, though most patients were treated with clopidogrel.

In a cohort of 1,926 ACS patients undergoing PCI (Abu-Assi E et al., *EuroIntervention*. 2018;13:1914–1922; <https://eurointervention.pconline.com/article/assessing-the-performance-of-the-precise-dapt-and-paris-risk-scores-for-predicting-one-year-out-of-hospital-bleeding-in-acute-coronary-syndrome-patients>), PRECISE-DAPT showed moderate discrimination for BARC type 3 or 5 bleeding (c-statistic 0.73) and modest discrimination for BARC 2, 3, or 5 bleeding (c-statistic 0.61).

Systematic Reviews/Meta-analyses:

In a systematic review and meta-analysis of 21 studies including 67,283 patients undergoing PCI (Munafò AR et al., *Eur Heart J Cardiovasc Pharmacother*. 2023;9:709–721; <https://academic.oup.com/ehjcvp/article/9/8/709/7252395?login=false>), the PRECISE-DAPT score demonstrated moderate discrimination for bleeding (pooled c-statistic 0.71), and patients with scores ≥ 25 had significantly higher odds of major bleed-

ing (OR ~3.5), supporting its external validity across diverse populations.

Clinical Practice Guidelines:

The 2017 ESC Focused Update on Dual Antiplatelet Therapy in Coronary Artery Disease (*Eur Heart J*. 2018;39:213–260) provides a Class IIb, Level of Evidence A recommendation to consider use of the PRECISE-DAPT score to help evaluate the benefit–risk balance when determining DAPT duration.

Formula

Nomogram from primary study

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)30397-5/abstract](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)30397-5/abstract). Costa F, Klaveren DV, James S et al. Derivation and validation of the predicting bleeding complications in patients undergoing stent implantation and subsequent dual antiplatelet therapy (PRECISE-DAPT) score: a pooled analysis of individual-patient datasets from clinical trials. *Lancet*. 2017 Mar 11;389(10073):1025-1034.

Facts & Figures

- Estimates 1-year bleeding risk in patients on dual antiplatelet therapy (DAPT) after PCI.
- Includes five common clinical variables: Age, creatinine clearance, hemoglobin, white blood cell count, and history of prior bleeding.
- High-risk cutoff: ≥ 25 points $\rightarrow$ high bleeding risk

Literature

Original/Primary

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)30397-5/abstract](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)30397-5/abstract)

Costa F, van Klaveren D, James S, et al. Derivation and validation of the predicting bleeding complications

in patients undergoing stent implantation and subsequent dual antiplatelet therapy (PRECISE-DAPT) score: a pooled analysis of individual-patient datasets from clinical trials. *Lancet*. 2017 Mar 11;389(10073):1025-1034.

Validation

URL

Citation in AMA format [?]

<https://www.abajournals.org/doi/10.1161/CIRCINTERVENTIONS.119.008530>

Choi KH, Song YB, Lee JM, et al. Clinical Usefulness of PRECISE-DAPT Score for Predicting Bleeding Events in Patients With Acute Coronary Syndrome Undergoing Percutaneous Coronary Intervention: An Analysis From the SMART-DATE Randomized Trial. *Circ Cardiovasc Interv*. 2020;13(5):e008530.

<https://eurointervention.pconline.com/article/assessing-the-performance-of-the-precise-dapt-and-paris-risk-scores-for-predicting-one-year-out-of-hospital-bleeding-in-acute-coronary-syndrome-patients>

Abu-Assi E, Raposeiras-Roubin S, Cobas-Paz R, et al. Assessing the performance of the PRECISE-DAPT and PARIS risk scores for predicting one-year out-of-hospital bleeding in acute coronary syndrome patients. *EuroIntervention*. 2018 Mar 20;13(16):1914-1922.

Other References (including meta-analyses, CPGs, and impact analyses)

URL

<https://academic.oup.com/ehjcvp/article/9/8/709/7252395>

Munafò AR, Montalto C, Franzino M, et al. External validity of the PRECISE-DAPT score in patients undergoing PCI: a systematic review and meta-analysis. *European Heart Journal — Cardiovascular Pharmacotherapy*. 2023 Dec 14;9(8):709-721.

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2017 ESC Focused Update on DAPT in Coronary Artery Disease. *Eur Heart J*. 2018 Jan 14;39(3):213-260.