Duration of dual antiplatelet therapy after coronary stent insertion

Does the benefit of extended therapy outweigh the risk?

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Dual antiplatelet therapy (DAPT) consisting of acetylsalicylic acid (ASA) plus a $P2Y_{12}$ inhibitor (ie, clopidogrel, prasugrel, or ticagrelor) is recommended after coronary stent insertion in patients with acute coronary syndrome (ACS).[1] These 2 types of antiplatelets work through different mechanisms to enhance inhibition of platelet aggregation and thereby reduce the risk of thrombosis. The standard duration of DAPT after coronary stent insertion is 12 months[1]; however, a number of recent trials have evaluated whether extending therapy beyond 1 year provides additional benefit.[2-5] Extended DAPT has been shown to reduce the risk of stent thrombosis and the risk of ACS occurring outside of the stented segment due to disease progression.[3] However, this benefit must be balanced against the risk of major bleeding associated with DAPT.[3]

This article will review the evidence for extended DAPT after coronary stent placement and address questions such as what the benefits and harms are with extended therapy, whether DAPT should be restarted in patients with a history of myocardial infarction (MI), which antiplatelets should be considered for extended therapy, and who requires gastroprotection.

Mr C.P., a 56-year-old man known to you, presents to your clinic today with questions regarding a comment his cardiologist made during a recent follow-up appointment. Fifteen months ago, he was admitted to hospital with a non–ST-segment elevation MI. He had no prior cardiac history and was not taking any medications at the time of the MI. His past medical history consisted of a nonsteroidal anti-inflammatory drug–induced gastric ulcer several years ago, which was treated with an 8-week course of pantoprazole.

During his hospital stay, he received 2 second-generation (everolimus) drug-eluting stents (DESs) in his left anterior descending artery (diameters of both stents were >3 mm). After the procedure, he was started on 75 mg/d of clopidogrel in combination with 81 mg/d of enteric-coated ASA, 10 mg/d of ramipril, 25 mg of metoprolol twice daily, 40 mg/d of atorvastatin, and 0.4 mg of sublingual nitroglycerin spray as needed. He was instructed to take clopidogrel for 1 year and ASA indefinitely. He was also restarted on 40 mg/d of pantoprazole, owing to his history of a gastric ulcer.

Today on physical examination he is in no obvious distress. His blood pressure is 124/76 mm Hg, and he weighs 85 kg. He has had no recurrent episodes of angina; a repeat treadmill test was done and revealed no abnormalities, and his recent ejection fraction was 55%. He believes he is in good health and leads an active lifestyle including daily walks. Results from his most recent laboratory blood tests revealed normal complete blood count, plasma glucose levels, thyroid function, liver enzyme levels, and renal function. His lipid panel findings were as follows: total cholesterol of 2.64 mmol/L, triglyceride level of 1.04 mmol/L, low-density lipoprotein level of 1.18 mmol/L, and high-density lipoprotein level of 0.99 mmol/L. He has not had any issues with bleeding in the past 15 months. He is a non-smoker and drinks 2 to 4 alcoholic beverages every weekend. He is married with 2 teenaged sons, and works full-time in an office setting.

His current medications are unchanged, except for clopidogrel, which was discontinued 3 months ago (1 year after insertion of coronary stents). Last month, Mr C.P. had a follow-up appointment with his cardiologist. During that visit, the cardiologist commented that he was fine with only 1 year of clopidogrel use for Mr C.P., but alluded to new evidence for longer DAPT. The cardiologist also made mention of a "low score" from some sort of calculator. Today Mr C.P. would like to know if he should be taking both ASA and clopidogrel, as he is worried about having another MI and "2 medications must be better than 1."

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Bringing evidence to practice

Several recent studies have attempted to identify the ideal duration of DAPT after coronary stent insertion.[2-12] The evaluated durations were as short as 3 to 6 months,[6-12] primarily including patients with non-ACS elective percutaneous coronary intervention, to as long as 36 months in patients with ACS.[2-5] The ideal

duration of DAPT is still unknown, but the standard duration after ACS with coronary stent remains 12 months.[1,13] For more information, see the RxFiles newsletter and chart on DAPT duration available at **CFPlus**.*

What is the benefit versus harm of DAPT beyond 12 months? For years, guideline committees have suggested that DAPT could be extended beyond 1 year in individuals with a high risk of thrombosis and a low risk of bleeding.[1,13-16] However, high-risk individuals (ie, those with a thrombotic event within 1 year of stent insertion) have been excluded from the trials that assessed extended duration. **Table 1** presents a summary of trials.[2-5,17-19] Four randomized controlled, open-label trials compared standard (12 months) with extended (>12 months) duration of therapy.[2-5] Each had similar designs, in that only patients who were "event free" (ie, no recurrent MI, stroke, repeat revascularization, or major bleed) after 1 year of DAPT were eligible for the extension phase.[2-5] Only the largest of the 4 trials, the DAPT (Dual AntiPlatelet Therapy) study, showed a benefit with extended DAPT.[3] (A DAPT trial summary is available at **CFPlus**.)* The investigators concluded that DAPT for 30 months after DES insertion reduced the risk of stent thrombosis (with a number needed to treat [NNT] of 100) and major adverse cardiovascular and cerebrovascular events (NNT = 63) compared with 12 months of therapy.[3] However, extended DAPT increased the risk of moderate to severe bleeding with a number needed to harm (NNH) of 112.[3] In addition, there was a trend toward greater all-cause mortality with extended DAPT (hazard ratio 1.36, 95% CI 1.00 to 1.85).[3]

It is important to note that approximately one-third of the patients enrolled in the DAPT study received a first-generation DES (eg, paclitaxel).[3] First-generation DESs are known to have a greater risk of very late stent thrombosis (ie, stent thrombosis occurring more than 1 year after stent insertion) compared with newer-generation DESs (eg, everolimus).[20] In a post hoc analysis of the DAPT trial, which excluded individuals who received paclitaxel stents, the difference in stent thrombosis between the treatment groups lessened (NNT changed from 100 to 205).[21] The DAPT investigators also wrote a separate article on extended DAPT in individuals who received a bare-metal stent.[22] They were unable to show a benefit with longer therapy in these individuals, but noted that the study was underpowered owing to difficulty with patient recruitment.[22]

The DAPT study investigators created a validated DAPT score calculator (**Table 2**).[23] This score can help heart specialists identify patients who might benefit from extended DAPT after they have completed 12 months of DAPT. The calculator balances the risk of thrombosis with the risk of bleeding; variables that were risk factors for both thrombosis and bleeding (eg, hypertension, chronic kidney disease, and peripheral artery disease) were excluded. Age is the only risk factor included for bleed risk. The score ranges from -2 to 10, and individuals with a score of 2 or more might benefit from DAPT beyond 1 year.[23]

Multiple meta-analyses were published following the release of the studies assessing varying DAPT durations after coronary stent insertion (**Table 3**).[24-31] The meta-analyses that compared standard (12 months) with extended DAPT (up to 36 months) concluded that longer therapy reduced the risk of MI and stent thrombosis but increased the risk of major bleeding and potentially all-cause mortality.[24-28,30,31] One of the meta-analyses concluded that for every 1000 patients treated per year, extended DAPT resulted in 8 fewer MIs but caused 6 more major bleeds and potentially 2 more deaths compared with shorter DAPT.[29] Extended DAPT did not reduce the risk of cardiovascular death, stroke, or repeat revascularization.[24-28,30,31] Although not applicable to the patient case, the studies comparing standard (12 months) to abbreviated DAPT (3 or 6 months) failed to show a benefit with standard duration; however, it is important to note that most of the patients enrolled in these studies were low risk (ie, non-ACS).[24-28,30,31]

> *You explain to Mr C.P. that the benefit of extending DAPT beyond 12 months might be outweighed by the increased risk of harm, based on the meta-analyses. You also use the DAPT score calculator (**Table 2**)[23] to address his question regarding the cardiologist's comment on his "low score." You calculate a score of 1 (MI at presentation), and therefore his risk of bleeding (NNH = 64) on extended DAPT outweighs the risk reduction in thrombosis (NNT = 153).[23] As noted above, the only bleeding risk factor included in the DAPT score is age, and therefore Mr C.P.'s score does not reflect his increased risk of a gastrointestinal (GI) bleed owing to his history of a gastric ulcer.*

Should DAPT be restarted in individuals with a history of a MI? Proponents of extended DAPT therapy argue that aside from evidence for reduction of stent thrombosis, there is also evidence for prevention of adverse events due to plaque rupture at sites remote from the stented segment.[3,19] In the DAPT trial, the rate of MI not related to the stent was statistically significantly lower with extended DAPT, suggesting that for every 91 patients treated with 30 months of DAPT, 1 fewer patient will have an MI remote from the stent location.[3]

*The RxFiles newsletter and chart on Duration of Dual Antiplatelet Therapy and Triple Therapy for Cardiovascular and Cerebrovascular Indications, as well as the DAPT and PEGASUS trial summaries, is available at **www.cfp.ca**. Go to the full text of this article online and click on **CFPlus** in the menu at the top right-hand side of the page.

Table 1. Summary of randomized controlled trials comparing standard versus extended durations of DAPT after coronary stent insertion, as well as after MI

STUDY	POPULATION	INTERVENTION OR COMPARATOR	OUTCOMES
Extended DAPT after coronary stent insertion			
• ARCTIC-Interruption,[2] 2014	• N = 1259 patients from France with DES (41.5% with G1DES) • Indication for PCI: excluded patients who underwent primary PCI for STEMI; included indications not defined at baseline	• DAPT 18 to 30 mo vs 12 mo • Type of $P2Y_{12}$ inhibitors: 90% clopidogrel and 10% prasugrel	• Primary end point (death, MI, ST, stroke, or urgent revascularization): not statistically significant • Major bleeding (STEEPLE): not statistically significant • Major or minor bleeding: 2% vs 1%; HR = 0.26 (95% CI 0.07-0.91); *P* = .04; NNH = 100 per 29 mo
• DAPT,[3] 2014	• N = 9961 patients with DES (27% with G1DES) • Approximately 90% from North America • There was no benefit with extended DAPT in individuals with a BMS • Indication for PCI: 38% stable angina, approximately 17% UA, 15.5% NSTEMI, 10.5% STEMI, and 20% other	• DAPT 30 mo vs 12 mo • Type of $P2Y_{12}$ inhibitors: 65% clopidogrel and 35% prasugrel	• Coprimary end points: -Stent thrombosis: 0.4% vs 1.4%; HR = 0.29 (95% CI 0.17-0.48); *P* < .001; NNT = 100 per 30 mo -MACCE*: 4.3% vs 5.9%; HR = 0.71 (95% CI 0.59-0.85); *P* < .001; NNT = 63 per 30 mo • Moderate-severe bleeding (GUSTO): 2.5% vs 1.6%; HR = 1.61 (95% CI 1.21-2.16); *P* = .001; NNH = 112 per 30 mo • All-cause mortality at 30 mo: 2% vs 1.5%; HR = 1.36 (95% CI 1-1.85); *P* = .052 • All-cause mortality at 33 mo (ie, 3 mo once DAPT complete): 2.3% vs 1.8%; HR = 1.36 (95% CI 1.02-1.82); *P* = .004; NNH = 200 per 33 mo
• DES-LATE,[4] 2014	• N = 5045 patients from Korea with DES (approximately 64% with G1DES) • Indication for PCI: 39% stable angina, 38% UA, 10.5% NSTEMI, and 12.5% STEMI	• DAPT 36 mo vs 12 mo • Type of $P2Y_{12}$ inhibitor: 100% clopidogrel	• Primary end point (death from CV causes, MI, stroke): not statistically significant • Stent thrombosis: not statistically significant • Major bleeding (TIMI): not statistically significant
• OPTIDUAL,[5] 2016	• N = 1385 patients from France with DES (approximately 34% with G1DES) • Indication for PCI: 32.2% stable angina, 21% silent ischemia, 15.6% NSTEMI, 11.3% STEMI, 9.2% UA, and 10.7% other	• DAPT 48 mo vs 12 mo (mean follow-up 33.4 mo) • Type of $P2Y_{12}$ inhibitor: 100% clopidogrel	• Primary end point: net adverse clinical events (death, MI, stroke, or major bleeding): not statistically significant • Major bleeding (ISTH): not statistically significant • Trial was stopped early owing to slow recruitment (enrolled 70.4% of target sample size)
Extended DAPT after MI			
• CHARISMA,[17,18] 2006	• N = 15 603 patients from 32 countries; study organized in the United States • 31.7% had a history of a MI • 22.8% had a history of PCI	• DAPT vs ASA alone for a median of 28 mo • Type of $P2Y_{12}$ inhibitor: 100% clopidogrel	• Primary end point (CV death, MI, stroke): -Overall, not statistically significant -Subgroup analysis of those with prior MI: 6.6% vs 8.3%; RR = 0.77 (95% CI 0.61-0.98); *P* = .031; NNT = 59 per 28 mo • Major bleeding (GUSTO): not statistically significant • Moderate bleeding: 2.1% vs 1.3%; RR = 1.61 (95% CI 1.27-2.08); *P* < .001; NNH = 125 per 28 mo

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Table 1 *continued from page 907*

STUDY	POPULATION	INTERVENTION OR COMPARATOR	OUTCOMES
• PEGASUS-TIMI 54,[19] 2015	• N = 21 162 (18% of population from North America; mean 1.7 y between index MI and enrolment) • 83% had a history of PCI with the index MI (41% with BMS, 39% with DES) • Type of MI: 53.6% STEMI, 40.6% NSTEMI, 5.8% unknown	• DAPT 1 to 3 y after MI vs placebo (median follow-up of 33 mo) • Type of $P2Y_{12}$ inhibitor during PEGASUS: one-third of patients used 90 mg of ticagrelor twice daily, one-third used 60 mg of ticagrelor twice daily, and one-third received placebo • Before enrolment, 94% of patients were using clopidogrel for the first 12 mo after their MI	• Primary end point (CV death, MI, or stroke): -High-dose ticagrelor vs placebo: 7.85% vs 9.04%; HR = 0.85 (95% CI 0.75-0.96); *P* = .008; NNT = 84 per 3 y -Low-dose ticagrelor vs placebo: 7.77% vs 9.04%; HR = 0.84 (95% CI 0.74-0.95); *P* = .004; NNT = 79 per 3 y • Major bleeding (TIMI): -High-dose ticagrelor vs placebo: 2.6% vs 1.06%; HR = 2.69 (95% CI 1.96-3.7); *P* < .001; NNH = 65 per 3 y -Low-dose ticagrelor vs placebo: 2.3% vs 1.06%; HR = 2.32 (95% CI 1.68-3.21); *P* < .001; NNH = 81 per 3 y • Discontinuation rates owing to dyspnea: -High-dose ticagrelor vs placebo: 6.5% vs 0.79%; HR = 8.89 (95% CI 6.65-11.88); *P* < .001; NNH = 18 per 3 y -Low-dose ticagrelor vs placebo: 4.55% vs 0.79%; HR = 6.06 (95% CI 4.5-8.15); *P* < .001; NNH = 27 per 3 y

ARCTIC-Intervention—Assessment by a double Randomization of a Conventional antiplatelet strategy versus a monitoring-guided strategy for drug-eluting stent implantation and, of Treatment Interruption versus Continuation 1 year after stenting-Interruption, ASA—acetylsalicylic acid, BMS—bare-metal stent, CHARISMA—Clopidogrel for High Atherothrombotic Risk and Ischemic Stabilization, Management, and Avoidance, CV—cardiovascular, DAPT—dual antiplatelet therapy, DES—drug-eluting stent, DES-LATE—Optimal Duration of Clopidogrel Therapy with DES to Reduce Late Coronary Arterial Thrombotic Event, G1DES—first-generation drug-eluting stent, GUSTO—Global Utilization of Streptokinase and Tissue Plasminogen Activator for Occluded Arteries, HR—hazard ratio, ISTH—International Society on Thrombosis and Hemostasis, MACCE—major adverse cardiovascular and cerebrovascular events, MI—myocardial infarction, NNH—number needed to harm, NNT—number needed to treat, NSTEMI—non–ST-segment elevation MI, OPTIDUAL—OPTImal DUAL antiplatelet therapy, PCI—percutaneous coronary intervention, PEGASUS-TIMI 54—Prevention of Cardiovascular Events in Patients with Prior Heart Attack Using Ticagrelor Compared to Placebo on a Background of Aspirin–Thrombolysis in Myocardial Infarction 54, RR—relative risk, ST—stent thrombosis, STEEPLE—Safety and Efficacy of Enoxaparin in PCI Patients, STEMI—ST-segment elevation MI, TIMI—thrombolysis in myocardial infarction, UA—unstable angina.
*Major adverse cardiovascular and cerebrovascular events including death, MI, or stroke.

The CHARISMA (Clopidogrel for High Atherothrombotic Risk and Ischemic Stabilization, Management and Avoidance) trial compared 75 mg/d of clopidogrel plus 75 to 162 mg/d of ASA with ASA alone for 28 months in patients with or at risk of cardiovascular disease.[17] Overall, DAPT did not show a benefit over ASA.[17] However, in a post hoc subgroup analysis of individuals with a history of MI, the patients randomized to the DAPT group had a lower rate of the primary end point (comprising cardiovascular death, MI, or stroke).[18] That said, the study was not powered to show a difference within this subgroup of patients.[18]

More recently, the PEGASUS-TIMI 54 (Prevention of Cardiovascular Events in Patients with Prior Heart Attack Using Ticagrelor Compared to Placebo on a Background of Aspirin–Thrombolysis in Myocardial Infarction 54) trial assessed the effect of prolonged DAPT on the natural progression of atherosclerosis.[19] (A PEGASUS trial summary is available at **CFPlus**.)* Patients with a history of MI 1 to 3 years before enrolment were randomized to 60 or 90 mg of ticagrelor twice daily or placebo, in addition to ASA.[19] Although there was no direct comparison between the 2 ticagrelor regimens, 60 mg of ticagrelor twice daily had a greater reduction in the primary end point (cardiovascular death, MI, or stroke) and less major bleeding.[19] Compared with placebo, 60 mg of ticagrelor twice daily for 3 years reduced the risk of cardiovascular death, MI, and stroke with an NNT of 79, but increased the risk of major bleeding (NNH = 81).[19] There was a mean duration of 1.7 years between the qualifying MI and enrolment into the study.[19] The investigators released an additional article assessing the effect of interrupting DAPT on the efficacy of ticagrelor.[32] Interruption of therapy was divided into 3 groups: 30 or fewer days, 31 days to 1 year, or more than 1 year.[32] Individuals who had stopped their therapy for longer than a month received no benefit from restarting DAPT with ticagrelor.[32] Approximately one-third of the study participants had no interruption of DAPT (ie, completed their 12 months of DAPT after MI and then were immediately enrolled into PEGASUS) or restarted DAPT within 30 days; these individuals might have a reduction in major adverse cardiovascular events with an additional 3 years of ticagrelor, but the study was not powered to detect a difference within this subgroup.[32]

You further explain to Mr C.P. that he has not been taking his DAPT for 3 months now, and there is limited evidence to suggest benefit with restarting a second antiplatelet. You stress the importance of continuing his low-dose ASA, which will reduce his risk of a subsequent event.

Which antiplatelets should be used with extended DAPT? The bulk of the evidence with extended DAPT

after coronary stent insertion is in patients who received a DES and were taking clopidogrel and ASA.[2-5,19] As noted above, the PEGASUS trial was a large study (N = 21 162) involving ticagrelor for 3 years after the initial 12 months of DAPT after MI.[19] However, only 7181 patients were enrolled in the ticagrelor arm that had either no interruption of DAPT or resumed therapy within 30 days (ie, the only group to show a benefit).[32] Of note, 94% of PEGASUS study participants received clopidogrel for the first 12 months of DAPT after their MI.[32]

Who should receive gastroprotection? The benefits of extended DAPT must be weighed against the risk of major bleeding, which increases the risk of morbidity and mortality. In addition to fatal bleeds, minor bleeds can negatively influence patient adherence resulting in premature discontinuation, which increases the risk of stent thrombosis and is potentially fatal.[33] Unfortunately, a validated tool does not exist for assessing an individual's risk of bleeding when DAPT is initiated. As noted above, if DAPT is to be extended beyond 1 year, the DAPT score calculator can be used to compare the risk of thrombosis to the risk of bleeding.[23]

Gastroprotection with a once-daily proton pump inhibitor (PPI) is an important consideration, as DAPT increases the risk of GI bleeding 2- to 3-fold compared with ASA alone.[34] The 2015 European Society of Cardiology Guidelines for the management of non–ST-segment elevation ACS recommends a PPI for individuals taking DAPT who have a higher-than-average risk of GI bleeding (class of recommendation I, level of evidence B).[14] Patient risk factors to consider for gastroprotection with a PPI are outlined in **Box 1**.[14,34] If a PPI is initiated because a patient is using DAPT and has a high risk of a GI bleed, the ongoing use of a PPI should be reassessed once DAPT is complete.

Table 2. The DAPT score calculator*: *With a score of less than 2, the risk of bleeding (NNH = 64) outweighs the risk of ischemic events (NNT = 153); therefore, use DAPT for 12 mo then stop. With a score of 2 or more, the risk of ischemic events (NNT = 34) outweighs the risk of bleeding (NNH = 272); therefore, extending DAPT beyond 12 mo can be considered.*

VARIABLE	POINTS
Patient characteristics	
Age, y	
• ≥ 75	-2
• 65-74	-1
• < 65	0
Diabetes mellitus	1
Cigarette smoker within past 2 y	1
Prior PCI or prior MI	1
History of heart failure or left ventricular ejection fraction < 30%	2
Index procedure characteristics	
MI at presentation	1
Vein graft PCI (stenting of vein of graft)	2
Stent diameter < 3 mm	1
Paclitaxel stent	1
Total	

DAPT—dual antiplatelet therapy, MI—myocardial infarction, NNH—number needed to harm, NNT—number needed to treat, PCI—percutaneous coronary intervention.
*The DAPT score calculator is available online at **www.daptstudy.org** and should only be used in individuals who received a drug-eluting stent.
Data from Yeh et al.[23]

Table 3. Summary of meta-analyses comparing various durations of DAPT after coronary stent insertion

OUTCOMES	STUDY-DEFINED LONG (12, 18, 24, 30, AND 36 MO) VS SHORT (3, 6, AND 12 MO) DAPT[24-31]	EXTENDED (18, 30, AND 36 MO) VS STANDARD (12 MO) DAPT[24-28,30,31]	ABBREVIATED (3 AND 6 MO) VS STANDARD (12 AND 24 MO) DAPT[24-28,30,31]
Benefit			
• MI	ARR = 0.7%-1%; NNT = 100-143	ARR = 1%-1.4%; NNT = 71-100	NS
• Stent thrombosis	ARR = 0.4%; NNT = 250	ARR = 0.6%-0.7%; NNT = 143-167	NS
Harm			
• All-cause mortality	ARI = 0.3%; NNH = 334* (3 of 7 meta-analyses were NS)	ARI = 0.4%; NNH = 250* (3 of 8 meta-analyses were NS)	NS
• Major bleeding	ARI = 0.5%-0.8%; NNH = 143-200	ARI = 0.7%-1.1%; NNH = 91-143	ARI = 0.2%-0.4%; NNH = 250-500
No benefit or harm			
• Cardiovascular mortality	NS	NS	NS
• Stroke	NS	NS	NS

ARI—absolute risk increase, ARR—absolute risk reduction, DAPT—dual antiplatelet therapy, MI—myocardial infarction, NNH—number needed to harm, NNT—number needed to treat, NS—not statistically significant
*Increased all-cause mortality risk was not found in all meta-analyses comparing different durations of DAPT.

Mr C.P. was restarted on a PPI when DAPT was initiated owing to his remote history of a GI ulcer and he continues to take it. He would now like to stop taking his pantoprazole to further reduce pill burden. You explain to him that he is still at increased risk of a subsequent GI ulcer or bleed due to the continued low-dose ASA, but the risk is less than with DAPT. His preference is still to stop the PPI, as his ulcer was several years ago and, at the time, was treated with an 8-week course of therapy. He agrees to avoid all other nonsteroidal anti-inflammatory drugs, including over-the-counter products, and to report any signs or symptoms of a GI ulcer or bleed.

After your discussion with him, he feels reassured with only taking 1 antiplatelet drug. You also encourage him to continue his daily walks and to maintain a healthy diet. This, along with blood pressure and lipid control, will help reduce his risk of a subsequent cardiac event.

Conclusion

For patients who do not experience a thrombotic event during the first 12 months of DAPT after coronary stent insertion, the potential reduction in thrombosis with extending DAPT beyond 1 year must be weighed against the potential increased risk of bleeding. For example, for every 1000 patients treated per year with extended DAPT, there are 8 fewer MIs but 6 more major bleeds and potentially 2 more deaths compared with shorter durations of DAPT.[29] If the heart specialist decides to extend therapy beyond 12 months, the decision is made 1 year after stent insertion and not at the time of percutaneous coronary intervention. Most of the evidence for extended DAPT is in patients who received a DES and were taking clopidogrel plus ASA.[2-5] Patients who are at high risk of a GI bleed should receive gastroprotection with a PPI; this should be reassessed once DAPT is complete.

Box 1. Patient risk factors to consider for gastroprotection with a PPI

Prescribe PPIs to patients who are taking DAPT and have risk factors for GI bleeding

- ≥ 1 of the following GI bleeding risk factors:
  - -History of a GI ulcer or bleed
  - -Anticoagulation therapy use
  - -Chronic use of NSAIDs or corticosteroid therapy
- ≥ 2 of the following GI bleeding risk factors:
  - -Age of 65 y or older
  - -Dyspepsia
  - -Gastroesophageal reflux disease
  - -*Helicobacter pylori* infection
  - -Chronic alcohol use

DAPT—dual antiplatelet therapy, GI—gastrointestinal, NSAID—nonsteroidal anti-inflammatory drug, PPI—proton pump inhibitor.
Data from Roffi et al,[14] Abraham et al.[34]

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