Journal of Geriatric Cardiology (2019) 16: 145–150

Review · **Open Access** ·

Bleeding risk assessment in elderly patients with acute coronary syndrome

Lucía Riobóo-Lestón, Sergio Raposeiras-Roubin, Emad Abu-Assi, Andrés Iñiguez-Romo

Department of Cardiology, University Hospital Álvaro Cunqueiro, Vigo, Spain

Abstract

Nowadays, elderly people represent a growing population segment with a well known increased risk of both ischemic and bleeding events. Current acute coronary syndrome guidelines, strongly recommend dual antiplatelet therapy (DAPT) with few specific references for aged patients due to lack of evidence. Patients aged ≥ 75 years are misrepresented in the classic derivation trials cohorts. Strategies to reduce the bleeding risk in this group of patients are urgently needed for the daily clinical practice. Identify the specific age related bleeding risk factors and the importance of an integral geriatric assessment remains challenging. Some of the available in-hospital and out-hospital bleeding risk scores have shown a lower to moderate predictive ability in older patients and no specific tools are developed in elderly population. The importance of an appropriate vascular access choice, type and duration of antiplatelet drugs is crucial to reduce the bleeding risk. Increase radial approaches and short DAPT duration leads to reduce hemorrhages. One interesting subgroup of patients is those who need chronic anticoagulation therapy after percutaneous coronary intervention, due to their very high risk of bleeding. New alternatives as dual therapy with oral anticoagulation and only one antiplatlet drug should be considered. In current review, we evaluate the available evidence about bleeding risk in elderly.

J Geriatr Cardiol 2019; 16: 145–150. doi:10.11909/j.issn.1671-5411.2019.02.002

Keywords: Acute coronary syndrome; Bleeding risk; Dual antiplatelet treatment; Elderly patients

1 Introduction

Each year, 17.9 million people die from cardiovascular disease, which is the main cause of loss of quality of life and dependency, especially in elderly people who represent a growing population segment.[1]

Nowadays, the cornerstones of the acute coronary syndrome (ACS) treatment are the new antitrombotic therapies and the percutaneous coronary intervention (PCI), exposing our patients to a higher risk of bleeding. Dual antiplatelet therapy (DAPT) is the standard care in ACS patients underwent PCI.

Elderly patients have been under-represented in the main ACS trials derivation cohorts which makes difficult to extrapolate the available information.[2] Currently, several studies have studied the effectiveness of an invasive strategy in elderly patients.[3–6] Results were controversial, especially in non-ST segment elevation ACS (NSTE-ACS), probably because of the heterogeneous basal characteristics of the groups like the degree of comorbidity or frail. The management of DAPT in elderly people remains challenging, with few specific recommendations in current guidelines, being an important gap of knowledge.[7]

It is known that elderly patients have increased both ischemic and bleeding risk.[8] It could be related to their intrinsic characteristics as: comorbidity, complex coronary disease, physical disabilities and frail. Recent studies have demonstrated that hemorrhagic risk exponentially rise from the seventh decade, increasing mortality, length of hospitalization and costs.[9,10] This is the reason why the evaluation of hemorrhagic risk plays a crucial role when faced the treatment of ACS in elderly patients. The use of bleeding risk scores identifies high risk patients and it helps clinicians to determine the DAPT regime and duration. At the present time, we have in the literature multiple bleeding classifications (Table 1); generating difficulties to compare the available bleeding risk scores.

The aim of this paper is summarizing the available information that it could help the clinicians facing the bleeding risk assessment of elderly people.

2 Factors associated with bleeding risk in elderly

Historically, factors related to the risk of bleeding have

Correspondence to: Lucía Riobóo-Lestón, MD, Department of Cardiology, University Hospital Álvaro Cunqueiro, Vigo, Spain. E-mail: lucia.rioboo.leston@sergas.es

Received: January 16, 2019 **Revised:** February 13, 2019
Accepted: February 18, 2019 **Published online:** February 28, 2019

Table 1. Bleeding classifications and definitions.

Classifications	Definitions
BARC	
0	No bleeding.
1	Bleeding is not actionable.
2	Any overt, actionable bleeding.
3a	Overt bleeding plus hemoglobin drop 3 to < 5 g/dL and any transfusion with overt bleeding.
3b	Overt bleeding plus hemoglobin drop 3 to ≥ 5 g/dL; includes cardiac tamponade and bleeding requiring surgical intevention or vasoactive agents.
4	CABG-related bleeding: perioperative intracraneal bleeding within 48 h; reoperation after closure os sternotomy for the purpose of controlling bleeding; transfusión of ≥ 5U whole blood or packed red blood cells within 48 h; chest tube output ≥ 2 L within 24 h.
5	Fatal bleeding.
GUSTO	
Mild	Bleeding that does not meet criteria for either severe or moderate bleeding.
Moderate	Bleeding that requires blood transfusion but does not result in haemodynamic compromise.
Severe or live threating intracraneal	Intracraneal hemorrhage or bleeding that cause hemodynamic compro-mise and requires intervention
TIMI	
Minimal	Overt hemorrhage associated with a fall in hemoglobin < 3 g/dL (hematocrit of < 9%).
Minor	Any clinically overt sign of hemorrhage associated with a fall in hemoglobin of 3 g/dL to ≤ 5 g/dL (hematocrit of 9% to ≤ 5%).
Major	Intracraneal or clinically significant overt signs of hemorrhage associated with a drop in hemoglobin of > 5 g/dL (hema-tocrit > 15%).

BARC: bleeding academic research consortium; CABG: coronary artery bypass graft; GUSTO: global use of strategies to open occluded arteries; TIMI: thrombolysis in myocardial infarction.

been identified, some of them closely related to age. Broadly speaking, we could classify them as non modifiable, potentially modifiable and modifiable factors.

2.1 Non modifiable

The principal non modifiable bleeding risk factors are age and female sex. Most of them are generally related to patient comorbidity as peripheral arteriopathy, diabetes mellitus, hypertension, stroke, malignancy and previous bleeding.

2.2 Potentially modifiable

Within the potentially modifiable factors, we include those that vary during the time and they may be affected by the medical therapies. For example: anticoagulation, use of chronic steroid or non steroid antiinflammatory drugs, renal function, hemoglobin, and a very frequent finding in elderly patients, trombocytopenia. Patients with thrombocytopenia were excluded from the derivation trials, but there is evidence that the risks of mortality and bleeding correlated directly with the thrombocytopenia severity.[11]

2.3 Modifiable

The modifiable factors are the cornerstone of the bleeding assessment. The type and duration of dual antiplatlet therapy, the invasive management, and the choice of vascular access, favours radia, femoral, are the most relevant ones.[12]

3 Bleeding risk assessment tools

In this section, we will summarize the main available scores in the literature up to the current time. The most relevant limitations of these tools are that the average age of the patients in the referral cohorts does not exceed 70 years old, the use of different bleeding definitions, the different presentation of coronary artery disease, and the heterogeneous clinical management in the studies. As we will see some of them have been specifically studied in elderly patients.

3.1 Inhospital bleeding

As is known that hemorrhagic events increase intra-hospital mortality.[13] Current guidelines recommend the use of bleeding risk scores in ACS patients to predict in-hospital bleeding.[14] The most widespread scores are summarized in Table 2.

Ariza, *et al*.[15] evaluated the predictive ability of CRUSADE, MEHRAN and ACTION bleeding risk scores in 2,036 consecutive ACS patients aged ≥ 75 years old. They

Table 2. Inhospital bleeding risk scores.

	CRUSADE[15]	ACTION[16]	ACUITY-HORIZONS[17] (MEHRAN)
Variables	Gender HR at admission Sistolic arterial preasure at admission HF DM Peripheral artery disease Hematocrit Creatinine	Gender Age Weight Sistolic arterial preasure at admission HR at admission Hemoglobin Creatinine DM Peripheral artery disease Previous oral anticoagulation ECG changes	Gender Age Creatinine White blood cell Anemia Type of ACS Type of antitrombotic medication (bivalirudin *vs.* non-bivalirudin)
Derivation cohort age, yrs	67 ± 13	64.0 (54.0–76.0)	62.1 ± 11.7

Data are presented as means ± SD or median (interquartile ranges). ACS: acute coronary syndrome; DM: diabetes mellitus; ECG: electrocardiogram; HF: heart failure; HR: heart rate.

found a consistent lower ability for all of them to predict in hospital major bleeding in this group. The vascular access was the most common location for inhospital bleedings in elderly people, followed by urinary and intracranial, instead of digestive and urinary that they are more common in younger patients. Likewise, Faustino, *et al*.[16] consistently observed a poor predictive ability of the CRUSADE score in a cohort of patients aged ≥ 80 years with NSTE-ACS.

Most of the previously described scores were validate in the pre ticagrelor-prasugrel era, which is not the real clinical practice nowadays. We need further investigation according actual approachess: early invasive PCI strategies, high percentages of radial vascular access, use of fondaparinux and limited glycoprotein IIb/IIIa inhibitors.

3.2 Outhospital bleeding

In recent years, there has been a growing concern about the evaluation of the hemorrhagic risk in the medium-long term. It is known that the scores created for the intrahospital bleeding risk assessment, they have low capacity when predicting bleeding in the extrahospitalary phase.[17] At the time of the newest antiplatlets treatments and last generation stents, knowing the probability of presenting a hemorrhagic event in the follow-up is of great relevance to help us to select the best therapeutic strategy including type and duration of antiplatelet therapy.

Recent DAPT guidelines recommend the use of risk scores to evaluate the benefits and risks of different DAPT durations.[18] Table 3 summarizes the main characteristics of the scores used for the hemorrhagic risk assessment at discharge. As we can see in the derivation cohorts mean and median ages (Table 2), patients older than 75 years are clearly underrepresented, which makes uncertain the application of these tools in an elderly population.

Regarding to PRECISE-DAPT score, a recent study showed no significant differences regarding the incidence of bleeding according to the recommended cutt of point ≥ 25. However, a progressive increase in the incidence of bleeding was observed across PRECISE-DAPT quartiles. These results suggest that the need for adapting of the PRECISE-DAPT score in non-selected elderly patients with ACS for an accurate assessment of bleeding risk.[19]

One recent study also assesed the predictive ability of the BleeMACS score in elderly patients.[20] They analyze 3,376 patients aged ≥ 75 years old, 5.6% presented hemorrhagic events during follow-up with a mean time to the episode shorter than younger patients (134 *vs.*159 days). There were no differences in the bleeding location being the most frequent gastrointestinal, genitourinary and intracranial. They found moderately-lower ability for predicting out hospital bleeding events in ≥ 75 years old group (0.652 *vs.* 0.691). So far there are no more studies that specifically evaluate the hemorrhagic risk in elderly patients with ACS.

4 Role of integral geriatric assessment in hemorrhagic risk stratification

Due to the specific characteristics and complexity of the elderly patients, the need of a comprehensive geriatric assessment in the ACS has been studied in the last years. The integral geriatric assessment is a dynamic and structured diagnostic process including functional, clinical, mental and social valoration in order to optimize resources and achieve the highest degree of independence and quality of life.

Nowadays, there are controversial findings about the usefulness of parameters such frailty to assess the risk of bleeding in the ACS. In the insights from the LONGEVO-SCA registry, Ariza, *et al*.[21] explored the role of a

Table 3. Outhospital bleeding risk scores.

	PARIS[22]	DAPT[23]	PRECISE-DAPT[24]	TRILOGY ACS[25]	BLEEMACS[26]
Clinical context	DAPT after PCI TT included	DAPT after PCI After 12 months eventsfree	DAPT after PCI TT not included	DAPT without revasculatization	DAPT after PCI TT included.
Variables	Age BMI Current smoking Anemia Renal dysfunction TT at discharge	Age Current smoking DM MI at presentation Prior PCI or Prior MI Paclitaxel eluting stent Stent diameter < 3 mm CHF or LVEF < 30% Vein graft stent	Age White blood cells Hemoglobin Creatinine clearance Prior bleeding	Age Gendre Angiography performed before randomisation Creatinine Hemoglobin	Age Hypertension Vascular disease Prior bleeding Malignancy Creatinine Hemoglobin
Classification	Low risk: 0–2 Intermediate risk: 4–7 High risk: ≥ 8	Score ≥ 2: long DAPT (30 months) Score < 2: standar DAPT (12 months)	Score ≥ 25: short DAPT (3–6 months) Score < 25: standar/long DAPT (12–24 months)		Very low risk: ≤ 7 Low risk: 8–16 Moderate risk: 17–25 High risk: ≥ 26
Prediction	From discharge to 24 months	From 12 months to 36 months	From discharge to 24 months	From discharge to 14 months	From discharge to 12 months
Derivation cohort age, yrs	CTE: 64 ± 12 No CTE: 63 ± 10.9 MB: 67.8 ± 10.7 No MB: 63.6 ± 11.0	CTE: 61.7 ± 10.8 No CTE: 61.3 ± 10.3 MB: 66.4 ± 10.3 No MB: 61.2 ± 10.3	65.0 (56.9–73.0)	66 (59–74)	63.6 ± 12.5

Data are presented as means ± SD or median (interquartile ranges). BMI: body mass index; CHF: congestive heart failure; CTE: coronary trombotic events; DAPT: dual antiplatelet therapy; DM: diabetes mellitus; LVEF: left ventricular ejection fraction; MB: major bleeding; MI: myocardial infarction; PCI: percutaneous coronary intervention; TT: triple therapy.

comprehensive geriatric assessment to predict in-hospital bleeding. Geriatric assessment included: functional capacity for basic activities of daily living (Barthel index), cognitive status (Pfeiffer test), frailty (Frail scale), comorbidity (Chalson index) and nutritional risk assessmenet (MNA-SF). They found from all of previous age-related variables, only comorbidity was significantly associated with in hospital major bleeding (MB). In the same way, White, *et al.*[22] in a substudy of TRILOGY ACS, they found that it is no association between frailty defined by Fried criteria and bleeding. On the other hand, Alonso Salinas, *et al.*[23] have done a study to determine if frailty measured by SHARE-FI index increases bleeding risk in patients with ACS. They included 190 patients ≥ 75 years old. 37.9% were categorized like frail patients. On multivariate analysis, frailty was an independent predictor for MB.

Some explanations for these different findings could be the use of different index to measure fragility and hemorrhagic events, it also maks them difficult to compare.

4.1 Antitrombotic teraphy

Current guidelines general recommend 12 months of DAPT in ACS patients but it emphasized on the importance of individualize according hemorrhagic risk, it being able to choose short patterns of DAPT(3-6 months) in patients at high bleeding risk.[24] The management of DAPT in elderly people remains challenging and we have little specific recommendations in guidelines.[25,26] Recent trials in old people using drug eluting stents with biodegradable polymers and short DAPT duration shows to reduce the risk of bleeding events with no significant increase of ischemic complications.[27,28]

Age-related organ changes affect to drug pharmacokinetics and pharmacodynamics.[29] The decrease in intestinal absorption, hepatic metabolism, body mass index, free water and muscle mass as well as the increase in fat, influences drugs efficacy and safety in this group of patients.

4.2 Chronic oral anticoagulation

Triple therapy (TT) is the standard care in patients with ACS ongoing to PCI and atrial fibrillation (AF). It is known that this strategy can triple the risk of bleeding.[30] Sambola, *et al.*[31] analyzed the efficacy and safety of TT in patients ≥ 75 years old with atrial fibrillation undergoing PCI in one study. They found lower thromboembolism rate in TT group than in DAPT one (0.6 % *vs.* 6.9%) but at the expense of increased MB events (11.7 % *vs.* 2.4%).

Current guidelines recommend different strategies depending if the main concern is the ischemic or the hemorrhagic events and propose strategies to reduce the risk in

anticoagulated patients including: use of HAS-BLED score, shorten the time of DAPT considering oral anticoagulation and clopidogrel instead of triple therapy in high bleeding risk patients, use of dircet oral anticoagulants (DOACs) over vitamin K antagonists (VKA), if VKA is need consider a lower target international normalized ratio (INR), use less than 100 mg daily atomic absorption spectrometry (AAS) and routine use of proton pump inhibitors (PPIs). The DAIGA score system (DAPT continuation, age > 75 years, INR > 2.2, gastrointestinal ulcer history, Anemia) proved usefullness for predicting bleeding complications and risk stratification of AF patients after drug-eluting stent (DES) implantation with triple antithrombotic therapy (TAT). The score showed better predictive ability for bleeding complications than the HAS-BLED score in this context.[32]

In a recent meta analisis, Cavallalri, *et al*.[33] includes 6036 patients from four controlled randomized trials (ISAR TRIPLE, PIONER AF-PCI, RE-DUAL-PCI and WOEST) with chronic oral anticoagulation indication after PCI. They conclude that in these patients dual antithrombotic therapy compared with TT, it reduces bleeding events without significant increased in ischemic events.

5 Conclusions

Age is an independent risk factor for bleeding. The management of ACS in this group of patients is challenging because they are misrepresented in trials and the evidence is scarce. The identification of different bleeding risk factors and bleeding risk assessment tools can help the clinician to optimize the therapeutic decisions. Few bleeding scores were validated in elderly population who parodoxically constitutes one of the higher bleeding risk groups. Despite the appearance of new antiplatelet treatments as well as strategies to reduce the hemorrhagic events in high risk patients (short term DAPT or dual therapy post PCI in patients' requirig chronic anticoagulation), further investigation is needed in all these fields for elderly population.

Acknowledgments

All authors report no conflicts of interest.

References

1 Mackay J. The Atlas of Heart Disease and Stroke: World Health Organization. https://who.int/cardiovascular_diseases.

2 Lee PY, Alexander KP, Hammill BG, *et al.* Representation of elderly persons and women in published randomized trials of acute coronary syndromes. *JAMA* 2001; 286: 708–713.

3 Savonitto S, Cavallini C, Petronio AS, *et al.* Early aggressive versus initially conservative treatment in elderly patients with non-ST-segment elevation acute coronary syndrome: a randomized controlled trial. *JACC Cardiovasc Interv* 2012; 5: 906–916.

4 Tegn N, Abdelnoor M, Aaberge L, *et al.* Invasive versus conservative strategy in patients aged 80 years or older with non-ST-elevation myocardial infarction or unstable angina pectoris (After Eighty study): an open-label randomised controlled trial. *Lancet* 2016; 387: 1057–1065.

5 Sanchis J, Núñez E, Barrabés JA, *et al.* Randomized comparison between the invasive and conservative strategies in comorbid elderly patients with non-ST elevation myocardial infarction. *Eur J Intern Med* 2016; 35: 89–94.

6 Llaó I, Ariza-Solé A, Sanchís J, *et al*. Invasive strategy and frailty in very elderly patients with acute coronary síndromes. *Eurointervention* 2018; 14: e336–e342.

7 Rich MW, Chyun DA, Skolnick AH, *et al*. Knowledge gaps in cardiovascular care of older adults: A scientific statement from the American Heart Association, American College of Cardiology, and American Geriatrics Society: executive summary. *J Am Geriatr Soc* 2016; 64: 2185–2192.

8 Avezum A, Makdisse M, Spencer F, *et al*. Impact of age on management and out- come of acute coronary syndrome: observations from the Global Registry of Acute Coronary Events(GRACE). *Am Heart J* 2005; 149: 67–73.

9 Roe MT, Goodman SG, Ohman EM, *et al*. Elderly patients with acute coronary syndromes managed without revascularization: insights into the safety of long-term dual antiplatelet therapy with reduced-dose prasugrel versus standard-dose clopidogrel. *Circulation* 2013; 128: 823–833.

10 Mehran R, Pocock S, Nikolsky E, *et al*. Impact of bleeding on mortality after percutaneous coronary intervention results from a patient-level pooled analysis of the REPLACE-2, ACUITY, and HORIZONS-AMI trials. *JACC Cardiovasc Interv* 2011; 4: 654–664.

11 McCarthy CP, Steg G, Bhatt DL. The management of antiplatelet therapy in acute coronary syndrome patients with thrombocytopenia: a clinical conundrum. *Eur Heart J* 2017; 38: 3488–3492.

12 Raposeiras Roubín S, Ariza Solé A. Update on hemorrhagic risk assesment in patients with ischemic heart disease. *Rev Esp Cardiol Supl* 2017; 17: 16–23.

13 Manoukian SV, Feit F, Mehran R, *et al*. Impact of major bleeding on 30-day mortality and clinical outcomes in patients with acute coronary syndromes: an analysis from the ACUITY Trial. *J Am Coll Cardiol* 2007; 49: 1362–1368.

14 Roffi M, Patrono C, Collet JP, *et al.* 2015 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. Task force for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation of the European Society of Cardiology (ESC). *G Ital Cardiol (Rome)* 2016; 17: 831–872.

15 Ariza-Solé A, Formiga F, Lorente V, *et al*. Efficacy of bleed-

ing risk scores in elderly patients with acute coronary syndromes. *Rev Esp Cardiol (Engl Ed)* 2014; 67: 463–470.
16 Faustino A, Mota P, Silva J, *et al*. Non-ST-elevation acute coronary syndromes in octogenarians: applicability of the GRACE and CRUSADE scores. *Rev Port Cardiol* 2014; 33: 617–627.
17 Garay A, Ariza-Solé A, Abu-Assi E, *et al*. Mid term bleeding risk prediction after an acute coronary syndrome: an unsolved question. *Rev Esp Cardiol* 2016; 69: 527–529.
18 Valgimigli M, Bueno H, Byrne RA, *et al*. 2017 ESC focused update on dual antiplatelet therapy in coronary artery disease developed in collaboration with EACTS: the task force for dual antiplatelet therapy in coronary artery disease of the European Society of Cardiology (ESC) and of the European Association for Cardio-Thoracic Surgery (EACTS). *Eur Heart J* 2018; 39: 213–260.
19 Guerrero C, Ariza-Solé A, Formiga F, *et al*. Applicability of the PRECISE-DAPT score in elderly patients with myocardial infarction. *J Geriatr Cardiol* 2018; 15: 713–717.
20 Garay A, Ariza-Solé A, Formiga F, *et al.* Prediction of post-discharge bleeding in eldery patients with acute coronary syndromes: insights form the BleeMACs registry. *Thromb Haemost* 2018; 118: 929–938.
21 Ariza-Solé A, Guerrero C, Formiga F, *et al*. Global geriatric assessment and in-hospital bleeding risk in elderly patients with acute coronary syndromes: insights from the LONGEVO-SCA registry. *Thromb Haemost* 2018; 118: 581–590.
22 White HD, Westerhout CM, Alexander KP, *et al*. Frailty is associated with worse outcomes in non- ST-segment elevation acute coronary syndromes: insights from the TaRgeted platelet Inhibition to cLarify the optimal strateGy to medicallY manage acute coronary syndromes (TRILOGY ACS) trial. *Eur Heart J Acute Cardiovasc Care* 2016; 5: 231–242.
23 Alonso Salinas GL, Sanmartín Fernández M, Pascual Izco M, *et al*. Frailty predicts major bleeding within 30 days in elderly patients with acute coronary syndrome. *Int J Cardiol* 2016; 222: 590–599.
24 Lee SY, Hong MK, Palmerini T, *et al.* Short-term versus long-term dual antiplatelet therapy after drug-eluting stent implantation in elderly patients: a meta-analysis of individual participant data from 6 randomized trials. *JACC Cardiovasc Interv* 2018; 11: 435–443.
25 Esmonde S, Sharma D, Peace A. Antiplatelet agents in uncertain clinical scenarios-a bleeding nightmare. *Cardiovasc Diagn Ther* 2018; 8: 647–662.
26 Mischie AN, Andrei CL, Sinescu C, *et al.* Antithrombotic treatment tailoring and risk score evaluation in elderly patients diagnosed with an acute coronary syndrome. *J Geriatr Cardiol* 2017; 14: 442–456.
27 Varenne O, Cook S, Sideris G, *et al*. Drug-eluting stents in elderly patients with coronary artery disease (SENIOR): a randomised single-blind trial. *Lancet* 2018; 391: 41–50.
28 Morice MC, Talwar S, Gaemperli O, *et al.* Drug-coated versus bare-metal stents for elderly patients: a predefined substudy of the LEADERSFREE trial. *Int J Cardiol* 2017; 243: 110–115.
29 Andreotti F, Rocca B, Husted S, *et al*. Antithrombotic therapy in the elderly: expert position paper of the European Society of Cardiology Working Group on Thrombosis. *Eur Heart J* 2015; 36: 3238–3249.
30 Paikin JS, Wright DS, Crowther MA, *et al*. Triple antithrombotic therapy in patients with atrial brillation and coronary artery stents. *Circulation* 2010;121: 2067–2070.
31 Sambola A, Mutuberría M, García Del Blanco B, *et al*. Impact of triple therapy in elderly patients with atrial fibrillation undergoing percutaneous coronary intervention. *PLoS One* 2016; 11: e0147245–e0147245.
32 Kobayashi N, Yamawaki M, Nakano M, *et al*. A new scoring system (DAIGA) for predicting bleeding complications in atrial fibrillation patients after drug-eluting stent implantation with triple antithrombotic therapy. *Int J Cardiol* 2016; 223: 985–991.
33 Cavallari I, Patti G. Meta-analysis comparing the safety and efficacy of dual versus triple antithrombotic therapy in patients with atrial fibrillation undergoing percutaneous coronary intervention. *Am J Cardiol* 2018; 121: 718–724.

This article is part of "**Prognostic and management of ACS in the elderly**" Special Issue.
Guest Editors: Prof. Albert Ariza Solé