

Generalization of Perioperative Beta-Blocker Studies by Mangano and POISE in a Preoperative Assessment Clinic

Odile Paquette, MD, Catherine St-Georges, MD, Matthieu Touchette, MD, Luc Lanthier, MD



About the Authors

Odile Paquette (left) and Catherine St-Georges are fifth-year residents in the Department of Internal Medicine; Matthieu Touchette and Luc Lanthier are professors in the Department of Medicine, University of Sherbrooke, Sherbrooke, Quebec. Correspondence may be directed to Luc.Lanthier@USherbrooke.ca.

Noncardiac surgery is associated with significant cardiac mortality and morbidity. The use of perioperative beta-blockers has been proposed to reduce or prevent cardiovascular events,¹⁻³ but there is significant controversy in the literature.²⁻⁹

The benefits of perioperative beta-blockers have been evaluated in two recent studies. Mangano et al. evaluated the impact of atenolol as a perioperative treatment in a population at risk of coronary artery disease undergoing major noncardiac surgery, whereas the POISE study was designed to evaluate the efficacy of metoprolol CR on patients with moderate or high cardiovascular risk.^{2,6,10} Moreover, the eligibility criteria for participation in these two studies were different. The generalization of these studies in a heterogeneous preoperative population is still unknown as no study has addressed this question.

Method

We conducted a retrospective cohort study of the patients assessed at the internal medicine preoperative clinic at Sherbrooke University

Hospital between November 2005 and November 2006. The cohort criteria included having had nonurgent surgery requiring hospital admission. Patients whose files were incomplete or whose surgeries were cancelled or performed as a day surgery were excluded.

The data were collected by reviewing computerized medical files. The general characteristics of the patients and the surgery and data pertinent to the inclusion and exclusion criteria of the Mangano and POISE studies were tabulated (Table 1).

The main objective was to determine the number of patients for whom beta-blocker treatment would have been indicated by applying the various criteria used in the Mangano and POISE studies, less those who were already taking this medication daily or for whom it was contraindicated. We used version 14.0 of the SPSS software to analyze these categorical variables with the chi-square test. The results are presented as a frequency and percentage. A *p* value <.05 was deemed statistically significant.

Table 1. MANGANO and POISE Criteria

Mangano

Indication: 1 of 2 criteria

1. CHD (MI, typical or atypical angina with positive stress test)
2. ≥ 2 risk factors: age ≥ 65 years, HBP, active smoker, cholesterol ≥ 6.2 mmol/L, diabetes

Contraindication

Systolic BP <100 mm Hg, pulse <55 bpm, third-degree AVB, heart failure, bronchospasm

POISE

Indication: Age >45 years, plus hospitalization >24 hours, plus 1 of the following 6 criteria:

1. CHD (angina, MI, exercise/nuclear/echocardiographic stress test + stenosis >50% by angiography, or ECG with Q waves in two continuous leads)
2. PAD (intermittent claudication, ABI ≤ 0.90 at rest, or stenosis >70% by Doppler or angiography)
3. Stroke caused by atherothrombotic disease
4. Hospitalization for heart failure in the past 3 years
5. Major vascular surgery
6. Three of the seven following risk factors: emergent/urgent surgery, high-risk surgery, heart failure, diabetes treated with oral hypoglycemic agents or insulin, preoperative creatinine >175 $\mu\text{mol/L}$, age >70 years, TIA

Contraindication

Pulse <50 bpm, 2nd- or 3rd-degree AVB without pacemaker, active asthma, bronchospastic COPD, beta-blocker side effects, CABG with complete revascularization <5 years and with no evidence of subsequent ischemia, low-risk surgery, use of verapamil

ABI = ankle-brachial index; AVB = atrioventricular block; CABG = coronary artery bypass graft; CHD = coronary heart disease; COPD = chronic obstructive pulmonary disease; ECG = electrocardiography; HBP = high blood pressure; MI = myocardial infarction; PAD = peripheral arterial disease; stroke = cerebrovascular accident; TIA = transient ischemic attack.

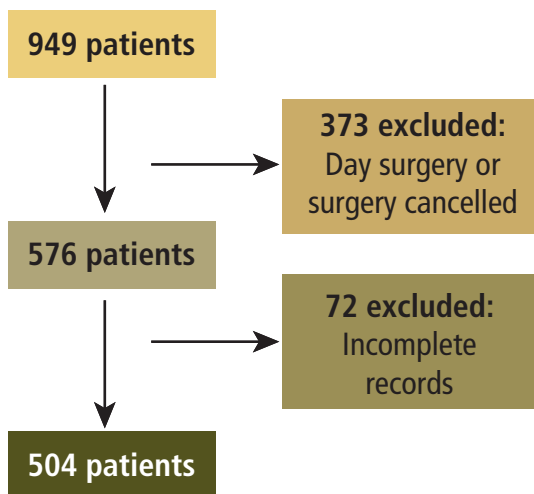


Figure 1. Study sample.

Results

Of the 949 patients assessed, 72 were excluded because their files were incomplete and 373 were excluded because their surgery was cancelled or performed as a day surgery. In total, 504 patients satisfied the study’s inclusion criteria (Figure 1). Nearly half of the patients were male (49%); the age was 67 ± 12 years (Table 2). Most of the patients had high blood pressure (65%) and dyslipidemia (53%). A third of the patients had coronary heart disease (32%). More than one third of the patients were on antihypertensive therapy, such as a diuretic (35%), beta-blocker (34%), calcium channel blocker (32%), or angiotensin-converting enzyme (ACE) inhibitor (31%) (Figure 2).

Applying the criteria used in the Mangano study, 396 (79%) of the patients had an indication for a beta-blocker prescription, but 187

(47%) of these patients had a contraindication or were already taking this medication on a daily basis (Table 3). In all, with these criteria, 209 of the 504 patients (42%) were therefore eligible for perioperative beta-blocker treatment.

Applying the criteria used in the POISE study, 208 (41%) of the patients had an indication for beta-blockade, but 160 (77%) of these patients had a contraindication for the medication or were already taking a beta-blocker. With the POISE criteria, 48 (10%) of the 504 patients were therefore eligible for perioperative beta-blocker treatment.

There is a significant difference between the criteria used in the Mangano and POISE studies as regards the indications (79% versus 41%, *p* < .001) and contraindications (7% versus 28%, *p* < .001) for beta-blocker treatment. A statistically significant difference was also found in the number of patients eligible for beta-blocker treatment in applying the Mangano and POISE criteria (42% versus 10%; *p* < .001).

Discussion

To date, there are no data in the literature on the generalization of perioperative beta-blocker studies. In fact, this is the first study on this topic.

Applying the POISE study criteria greatly restricted the prescription of perioperative beta-blockers compared with the Mangano-study criteria. The criteria for inclusion in this study preferentially targeted patients at risk of perioperative heart disease and cardiac events. The various contraindications associated with the use of beta-blockers are also much more detailed in the POISE study, and they therefore limit the prescription of this medication. It is also interesting to observe that although the POISE criteria target a more precise group of patients at risk, the results of that study are still inconclusive because the reduction

Table 2. Patient Characteristics

Variables	Patients <i>n</i> = 504
Age (years)	67 ± 12
Male	249 (49%)
Consumes alcohol	35 (7%)
CHD	164 (32%)
Cardiovascular risk factors	
Tobacco	85 (17%)
HBP	329 (65%)
Diabetes	126 (25%)
Dyslipidemia	294 (53%)
Other comorbidities	
AF/flutter	58 (11%)
Heart failure	16 (3%)
TCI/stroke	39 (7%)
PAD	48 (9%)

AF = atrial fibrillation; CHD = coronary heart disease; HBP = high blood pressure; PAD = peripheral arterial disease; stroke = cerebrovascular accident; TCI = transient cerebral ischemia.

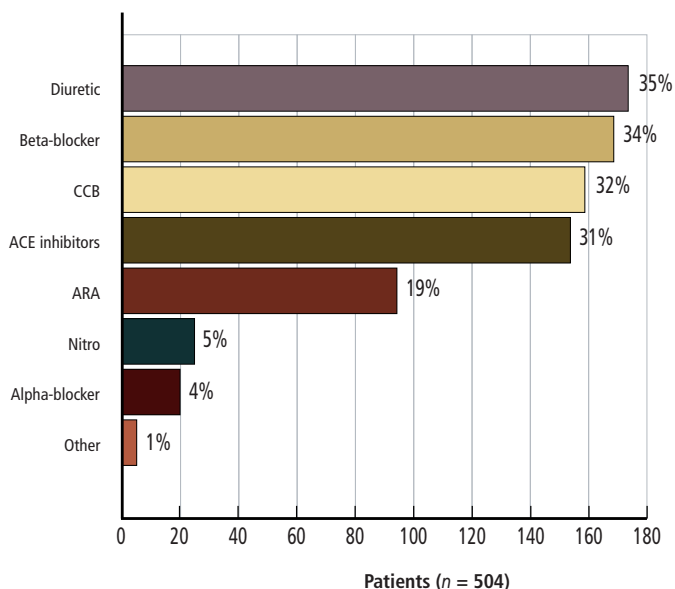


Figure 2. Medication at preoperative clinic. ACE = angiotensin-converting enzyme; ARA = angiotensin receptor antagonist; CCB = calcium channel blocker.

Table 3. Administration of Beta-Blockers When Applying the Mangano and POISE Criteria

Variables	Mangano	POISE	p Value
BB indicated	396/504 (79%)	208/504 (41%)	<.001
Contraindication or use of BB	187/396 (47%)	160/208 (77%)	.005
Contraindication	26/396 (7%)	58/208 (28%)	<.001
Use of BB	161/396 (41%)	102/208 (48%)	.048
BB indicated and absence of contraindication or use of BB	209/504 (42%)	48/504 (10%)	<.001

BB = beta-blocker.

in cardiac death, nonfatal heart attacks, and cardiac arrest was achieved at the cost of an increase in total mortality and strokes, which may well greatly limit the use of beta-blockers as a perioperative treatment.^{6,9}

In conclusion, an application of the POISE criteria for prescribing perioperative beta-blockers makes a case for using this medication in a much more targeted population. Generalizing the Mangano and POISE studies on the use of perioperative beta-blockers therefore produces very different results.

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Future Developments in GIM

Medical Simulation: Part 2 – Present and Future

Peter Brindley, MD



About the Author

Peter Brindley is an associate professor in the Division of Critical Care, University of Alberta, Edmonton, Alberta. He is the medical lead for patient simulation for Capital Health, Alberta, and vice-president for the nonprofit Canadian Resuscitation Institute. Correspondence may be directed to peterbrindley@cha.ab.ca.

Part 1 of this series (*CJGIM Volume 3, Issue 3*, pp. 172–174) addressed the unique opportunities offered by simulation and the challenges that must be overcome. Part 2 reviews existing programs and identifies research issues likely to dominate the future.

Introduction

This is an exciting time for medical simulation! The cutting-edge of simulation now appears to be collaborative simulation, evidence-based simulation, and developing the science of simulation. National