

Perioperative Beta-Blocker Management

Intraoperative teaching · CA-2

THE QUESTION

Where the evidence disagrees

This topic was selected because an evidence synthesis beats a textbook on it: the trials disagree, or the guidance has moved recently.

THE EVIDENCE

What each source contributes, and how strong it is

Study design first — a cohort and a randomised trial do not carry the same weight.

Design	Year	Journal	What it found
Meta-analysis	2014	Heart (British Cardiac Society)	Pooling only the trials whose data remain secure, starting a beta-blocker before
Randomised trial	2008	England)	Starting extended-release metoprolol before noncardiac surgery reduced myocardial
Cohort	2005	The New England journal of medicine	The association between perioperative beta-blockade and survival tracks baseline risk
Review	2018	Journal of cardiothoracic and vasc	Ultra-short-acting agents such as esmolol and landiolol offer the effects of
Cohort	2013	JAMA	Beta-blocker exposure around major noncardiac surgery was associated with lower
Review	2026	British journal of anaesthesia	Long-term preoperative beta-blocker prescription is independently associated with

6 resolved citations behind this deck; every point above traces to one of them.

WHERE THE GUIDANCE SITS

Pooling only the trials whose data remain secure, starting a beta-blocker before

Meta-analysis · Heart (British Cardiac Society)

Pooling only the trials whose data remain secure, starting a beta-blocker before noncardiac surgery increased 30-day all-cause mortality by 27%, and increased stroke and hypotension while reducing non-fatal myocardial infarction.

Meta-Analysis of Secure Randomised Controlled Trials of β -Blockade to Prevent Perioperative Death in Non-Cardiac Surgery, Heart (British Cardiac Society) 2014 · PMID 23904357

WHAT THE TRIALS FOUND

Starting extended-release metoprolol before noncardiac surgery reduced myocardial

Randomised trial · England)

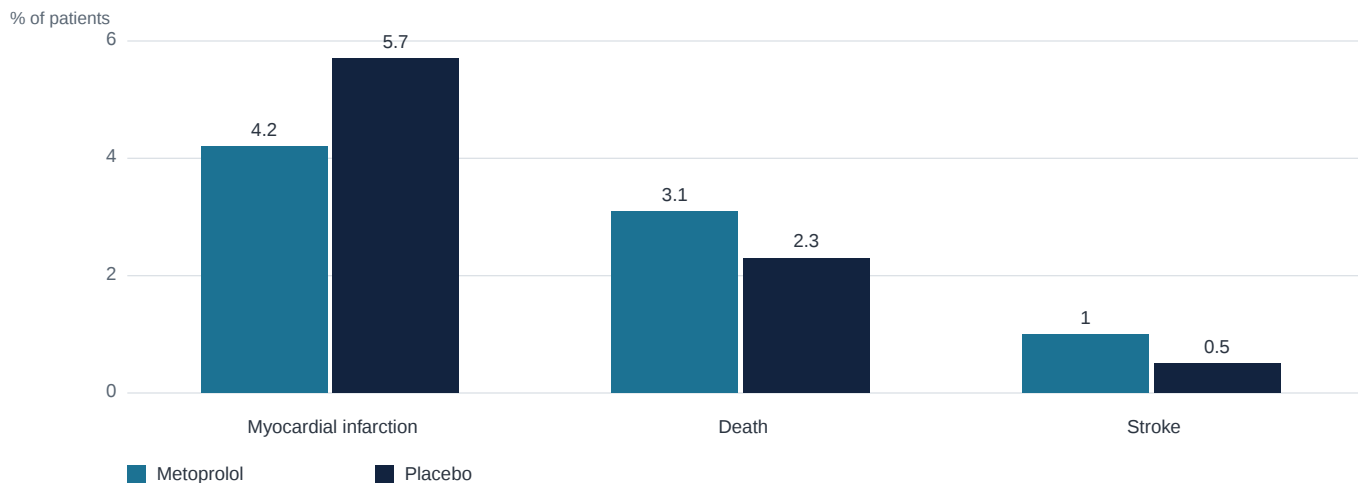
Starting extended-release metoprolol before noncardiac surgery reduced myocardial infarction from 5.7% to 4.2% but increased death from 2.3% to 3.1% and doubled stroke from 0.5% to 1.0%.

Effects of Extended-Release Metoprolol Succinate in Patients Undergoing Non-Cardiac Surgery (POISE Trial): A Randomised Controlled Trial, Lancet (London, England) 2008 · PMID 18479744

THE NUMBERS

POISE: fewer infarcts, more deaths and strokes

Extended-release metoprolol versus placebo, 8,351 patients.



Starting a beta-blocker traded one harm for another — fewer infarcts, but more deaths and double the strokes.

Effects of Extended-Release Metoprolol Succinate in Patients Undergoing Non-Cardiac Surgery (POISE Trial): A Randomised Controlled Trial, Lancet (London, England) 2008 · PMID 18479744

IN PRACTICE

What the cohorts and reviews add

4 findings, each on the slide that follows.

THE NEW ENGLAND JOURNAL OF MEDICINE 2005

The association between perioperative beta-blockade and survival tracks baseline risk

The association between perioperative beta-blockade and survival tracks baseline risk: benefit appeared at a Revised Cardiac Risk Index of 2 or more,...

JOURNAL OF CARDIOTHORACIC AND VASCULAR ANESTHESIA 2018

Ultra-short-acting agents such as esmolol and landiolol offer the effects of

Ultra-short-acting agents such as esmolol and landiolol offer the effects of beta-blockade without the detrimental effects of long-acting agents,...

JAMA 2013

Beta-blocker exposure around major noncardiac surgery was associated with lower

Beta-blocker exposure around major noncardiac surgery was associated with lower 30-day mortality only in patients with two or more Revised Cardiac...

BRITISH JOURNAL OF ANAESTHESIA 2026

Long-term preoperative beta-blocker prescription is independently associated with

Long-term preoperative beta-blocker prescription is independently associated with increased postoperative ischaemic stroke risk at 30 and 365 days,...

IN PRACTICE

The association between perioperative beta-blockade and survival tracks baseline risk

Cohort · The New England journal of medicine

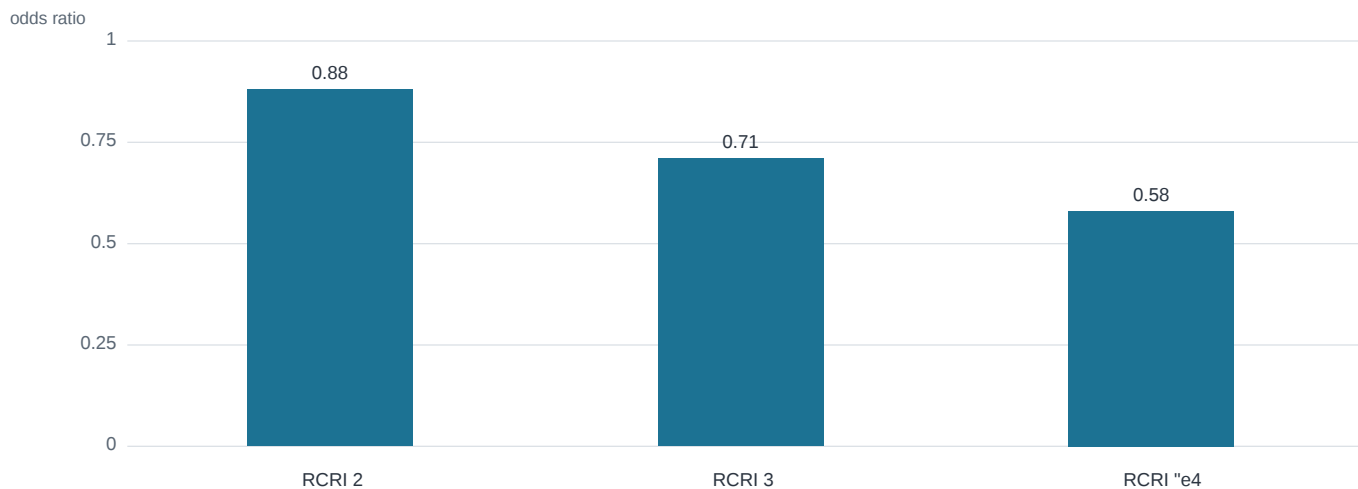
The association between perioperative beta-blockade and survival tracks baseline risk: benefit appeared at a Revised Cardiac Risk Index of 2 or more, with no benefit and possible harm at a score of 0 or 1.

Perioperative Beta-Blocker Therapy and Mortality after Major Noncardiac Surgery, The New England journal of medicine 2005 · PMID 16049209

THE NUMBERS

Benefit tracks baseline cardiac risk

Adjusted odds of in-hospital death by Revised Cardiac Risk Index score.



Association with survival appeared only from RCRI 2 upward; at 0–1 there was no benefit and possible harm.

Perioperative Beta-Blocker Therapy and Mortality after Major Noncardiac Surgery, The New England journal of medicine 2005 · PMID 16049209

IN PRACTICE

Ultra-short-acting agents such as esmolol and landiolol offer the effects of

Review · Journal of cardiothoracic and vasc

Ultra-short-acting agents such as esmolol and landiolol offer the effects of beta-blockade without the detrimental effects of long-acting agents, which are hard to counteract once given perioperatively.

Ultra-Short-Acting β -Blockers (Esmolol and Landiolol) in the Perioperative Period and in Critically Ill Patients, Journal of cardiothoracic and vascular anesthesia 2018 · PMID 29398384

IN PRACTICE

Beta-blocker exposure around major noncardiac surgery was associated with lower

Cohort · JAMA

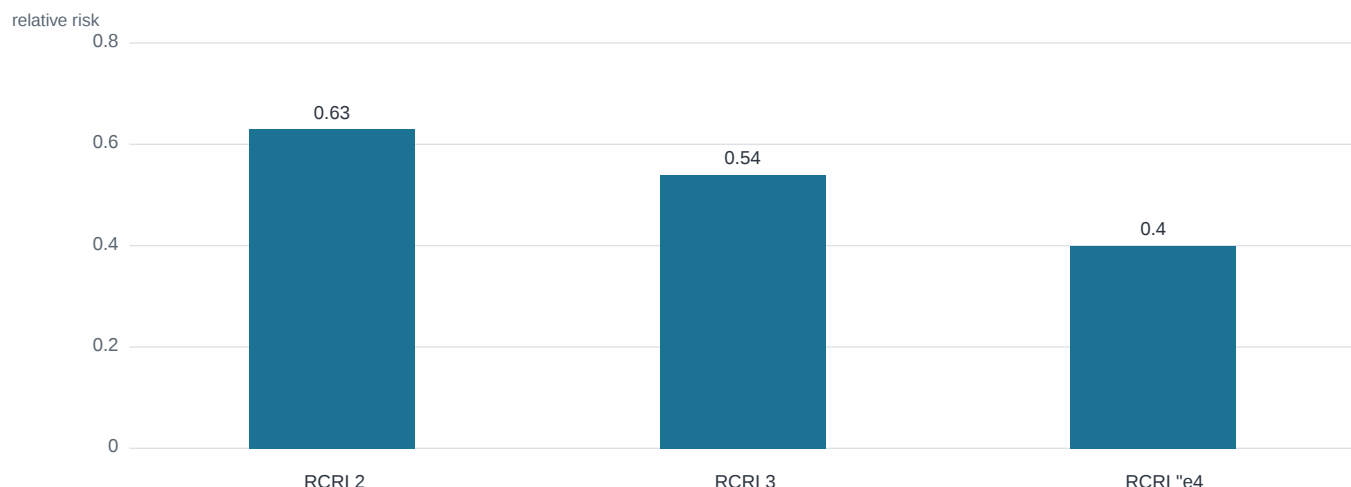
Beta-blocker exposure around major noncardiac surgery was associated with lower 30-day mortality only in patients with two or more Revised Cardiac Risk Index factors, and only in nonvascular surgery.

Association of Perioperative β -Blockade With Mortality and Cardiovascular Morbidity Following Major Noncardiac Surgery, JAMA 2013 · PMID 23613075

THE NUMBERS

Mortality benefit only in the higher-risk, nonvascular patients

Relative risk of 30-day death, propensity-matched.



The same risk-dependence in a second, larger dataset — and confined to nonvascular surgery.

Association of Perioperative β -Blockade With Mortality and Cardiovascular Morbidity Following Major Noncardiac Surgery, JAMA 2013 · PMID 23613075

IN PRACTICE

Long-term preoperative beta-blocker prescription is independently associated with

Review · British journal of anaesthesia

Long-term preoperative beta-blocker prescription is independently associated with increased postoperative ischaemic stroke risk at 30 and 365 days, especially in lower-risk patients.

Beta Blockers, Stroke, and Noncardiac Surgery: Resolving an Enduring Perioperative Dilemma, British journal of anaesthesia 2026 · PMID 42290631

IN THE ROOM

What this changes about the next case

Colour is the strength of the evidence behind each step, not the urgency.

- 1 Pooling only the trials whose data remain secure, starting a beta-blocker before noncardiac surgery increased 30-day all-cause mortality by 27%, and increased stroke and hypotension while reducing non-fatal myocardial infarction.
- 2 Starting extended-release metoprolol before noncardiac surgery reduced myocardial infarction from 5.7% to 4.2% but increased death from 2.3% to 3.1% and doubled stroke from 0.5% to 1.0%.
- 3 The association between perioperative beta-blockade and survival tracks baseline risk: benefit appeared at a Revised Cardiac Risk Index of 2 or more, with no benefit and possible harm at a score of 0 or 1.
- 4 Beta-blocker exposure around major noncardiac surgery was associated with lower 30-day mortality only in patients with two or more Revised Cardiac Risk Index factors, and only in nonvascular surgery.
- 5 Ultra-short-acting agents such as esmolol and landiolol offer the effects of beta-blockade without the detrimental effects of long-acting agents, which are hard to counteract once given perioperatively.

KEY TAKEAWAYS

What to carry into the next case

Pooling only the trials whose data remain secure, starting a beta-blocker before
Heart (British Cardiac Society) 2014

Starting extended-release metoprolol before noncardiac surgery reduced myocardial
England) 2008

The association between perioperative beta-blockade and survival tracks baseline risk

The New England journal of medicine 2005

Ultra-short-acting agents such as esmolol and landiolol offer the effects of

Journal of cardiothoracic and vascular anesthesia 2018

Pooling only the trials whose data remain secure, starting a beta-blocker before

QUESTIONS I'LL ASK YOU IN THE ROOM

1. How does your plan change if the patient is not optimised?
2. What is the physiology behind what we just did?
3. Talk me through the trade-off you made there.
4. What would make you abandon this plan and do something else?

ORAL BOARDS STEM

A 68-year-old on long-standing metoprolol for rate control presents for elective hip arthroplasty. He took his dose this morning. A colleague suggests starting a beta-blocker in the patient in the next room, who is not on one but has three cardiac risk factors.

BOARD QUESTIONS

1. Name the two ultra-short-acting beta-blockers described for use in the perioperative period and in critically ill patients, and state the specific advantage they are said to have over long-acting beta-blockers once a dose has already been given during a case.
2. In the POISE trial, extended-release metoprolol was started before noncardiac surgery. State what happened to myocardial infarction, death, and stroke, giving the event rates for each, and summarise in one sentence the trade-off the trial demonstrated.
3. A study of perioperative beta-blocker therapy after major noncardiac surgery analysed survival by Revised Cardiac Risk Index score. Describe how the relationship between beta-blockade and survival varied across the risk spectrum, and state what kind of relationship the study supports.
4. A meta-analysis restricted to the trials of perioperative beta-blockade whose data remain secure pooled outcomes for starting a beta-blocker before noncardiac surgery. State each outcome and its direction, including the mortality figure, and then say what this pooled analysis does not address.

ANSWER KEY

1. Esmolol and landiolol. They offer the effects of beta-blockade without the detrimental effects of long-acting agents, which are hard to counteract once they have been given perioperatively.

The appeal of esmolol and landiolol is that the exposure is short: with a long-acting beta-blocker, once it is in, its effects are hard to counteract for the rest of the case.

Ultra-Short-Acting β -Blockers (Esmolol and Landiolol) in the Perioperative Period and in Critically Ill Patients, Journal of cardiothoracic and vascular anesthesia 2018 · PMID 29398384

2. Myocardial infarction fell from 5.7% to 4.2%, but death rose from 2.3% to 3.1% and stroke doubled from 0.5% to 1.0%. The trial traded fewer myocardial infarctions for more deaths and twice as many strokes.

POISE is why starting a beta-blocker to prevent infarction is not a free move: the infarctions prevented came alongside more deaths and double the stroke rate.

Effects of Extended-Release Metoprolol Succinate in Patients Undergoing Non-Cardiac Surgery (POISE Trial): A Randomised Controlled Trial, Lancet (London, England) 2008 · PMID 18479744

3. The association between perioperative beta-blockade and survival tracked baseline risk: benefit appeared at a Revised Cardiac Risk Index of 2 or more, with no benefit and possible harm at a score of 0 or 1. It is an association with survival across risk strata, not a demonstrated causal effect of beta-blockade.

Stratify before you generalise: the survival association here sat with a Revised Cardiac Risk Index of 2 or more, and at 0 or 1 it pointed to no benefit and possible harm.

Perioperative Beta-Blocker Therapy and Mortality after Major Noncardiac Surgery, The New England journal of medicine 2005 · PMID 16049209

4. Pooling only the trials whose data remain secure, starting a beta-blocker before noncardiac surgery increased 30-day all-cause mortality by 27%, increased stroke and hypotension, and reduced non-fatal myocardial infarction. The analysis is about starting a beta-blocker before surgery, so it does not address patients already established on chronic beta-blockade, and it reports pooled outcomes rather than which individual patients should or should not be treated.

Once the insecure trials are removed, the pooled signal for starting a beta-blocker is a 27% increase in 30-day mortality plus more stroke and hypotension, in exchange for fewer non-fatal infarctions.

Meta-Analysis of Secure Randomised Controlled Trials of β -Blockade to Prevent Perioperative Death in Non-Cardiac Surgery, Heart (British Cardiac Society) 2014 · PMID 23904357

Pooling only the trials whose data remain secure, starting a beta-blocker before

SOURCES

- [1] Meta-Analysis of Secure Randomised Controlled Trials of β -Blockade to Prevent Perioperative Death in Non-Cardiac Surgery, Heart (British Cardiac Society) 2014 · PMID 23904357
- [2] Effects of Extended-Release Metoprolol Succinate in Patients Undergoing Non-Cardiac Surgery (POISE Trial): A Randomised Controlled Trial, Lancet (London, England) 2008 · PMID 18479744
- [3] Perioperative Beta-Blocker Therapy and Mortality after Major Noncardiac Surgery, The New England journal of medicine 2005 · PMID 16049209
- [4] Ultra-Short-Acting β -Blockers (Esmolol and Landiolol) in the Perioperative Period and in Critically Ill Patients, Journal of cardiothoracic and vascular anesthesia 2018 · PMID 29398384
- [5] Association of Perioperative β -Blockade With Mortality and Cardiovascular Morbidity Following Major Noncardiac Surgery, JAMA 2013 · PMID 23613075
- [6] Beta Blockers, Stroke, and Noncardiac Surgery: Resolving an Enduring Perioperative Dilemma, British journal of anaesthesia 2026 · PMID 42290631

DRAFT — NOT
APPROVED