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Servicio de Anestesia,
Reanimación y Tratamiento del Dolor
HOSPITAL GENERAL UNIVERSITARIO VALENCIA

Revisión de las guías clínicas sobre troponinas perioperatorias de la ESAIC

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Servicio de Anestesia Reanimación y Tratamiento del Dolor
Consorcio Hospital General Universitario de Valencia

SARTD-CHGUV Sesión de Formación Continuada
Valencia, 5 de marzo de 2024

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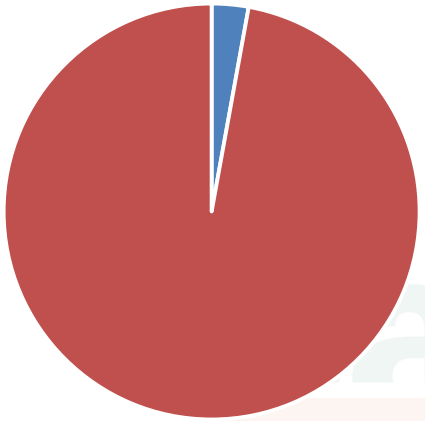
INTRODUCCIÓN



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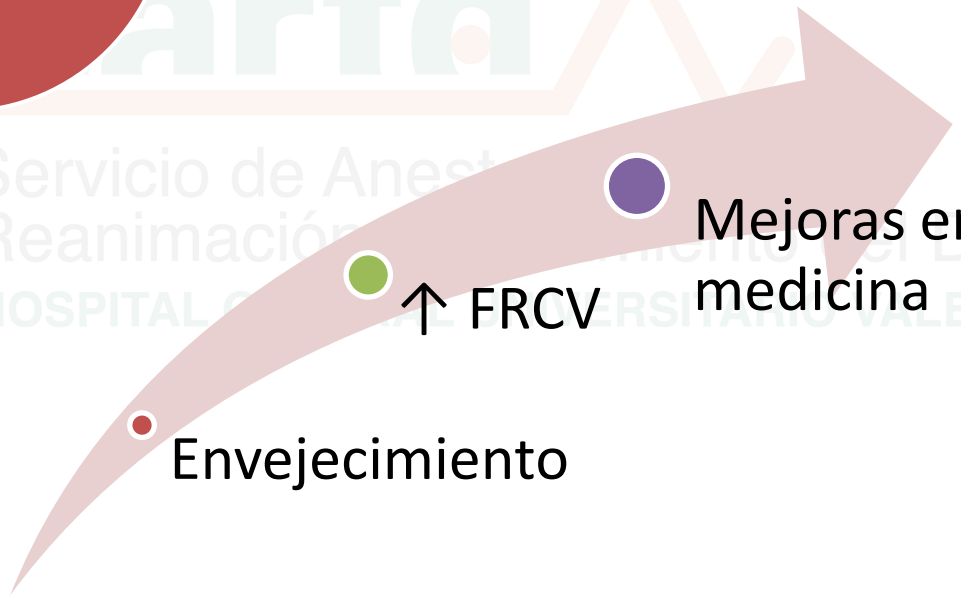
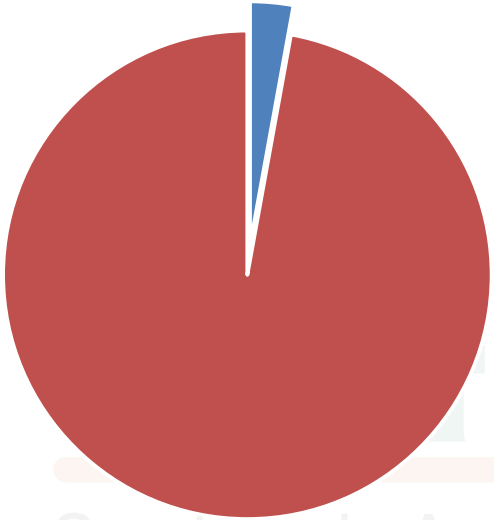
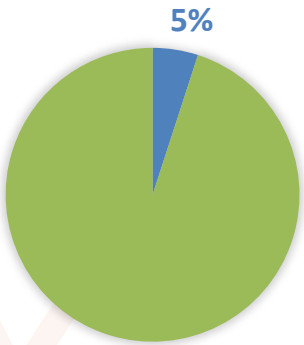


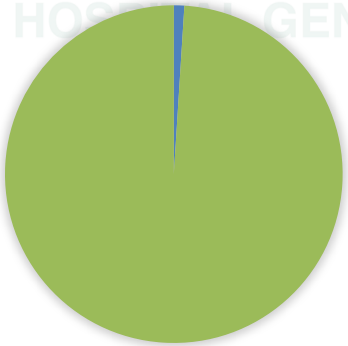
INTRODUCCIÓN



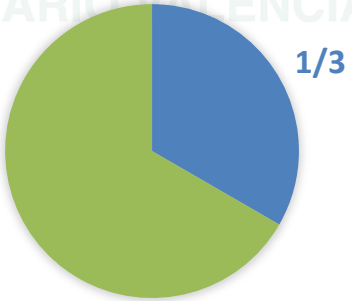
COMPLICACIÓN CARDÍACA 30 DÍAS



MORTALIDAD 30 DÍAS



MUERTES POR COMPLIC. CARDIOVASC.



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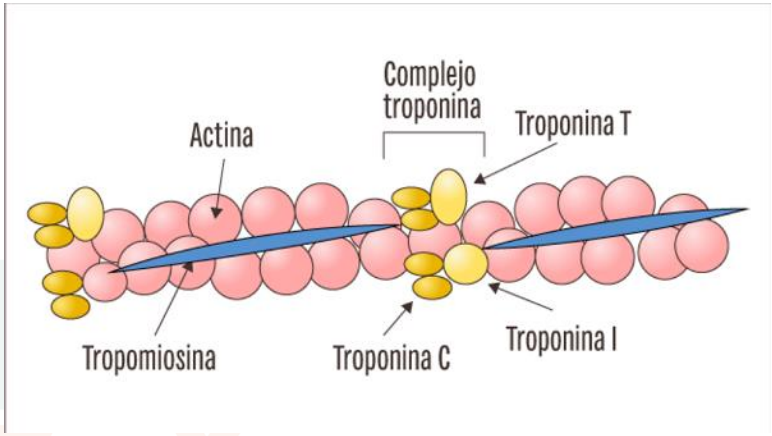

Prognostic Value of Troponin and Creatine Kinase Muscle and Brain Isoenzyme Measurement after Noncardiac Surgery

A Systematic Review and Meta-analysis

<u>Elevación postquirúrgica de Tn</u>: predictor independiente de mortalidad, especialmente en el primer año.

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The Vascular Events In Noncardiac Surgery Cohort Evaluation (VISION) Study

Association Between Postoperative Troponin Levels and 30-Day Mortality Among Patients Undergoing Noncardiac Surgery

15.000 pacientes.
Pico postoperatorio TnT < 3d.
↔ mortalidad 30 d.

Myocardial Injury after Noncardiac Surgery

A Large, International, Prospective Cohort Study Establishing Diagnostic Criteria, Characteristics, Predictors, and 30-day Outcomes

Mismos pacientes
MINS ↔ ↑ mortalidad

JAMA | Original Investigation

Association of Postoperative High-Sensitivity Troponin Levels With Myocardial Injury and 30-Day Mortality Among Patients Undergoing Noncardiac Surgery

21.000 pacientes
Pico postoperatorio hsTnT < 3d.
↔ mortalidad 30 d.

↑ hsTnT Ø clínica isquémica
↔ mortalidad 30 d.

- **Definición de daño miocárdico (*MINS*).**

- **Evidencia a favor del *screening* de troponinas.**

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MINS

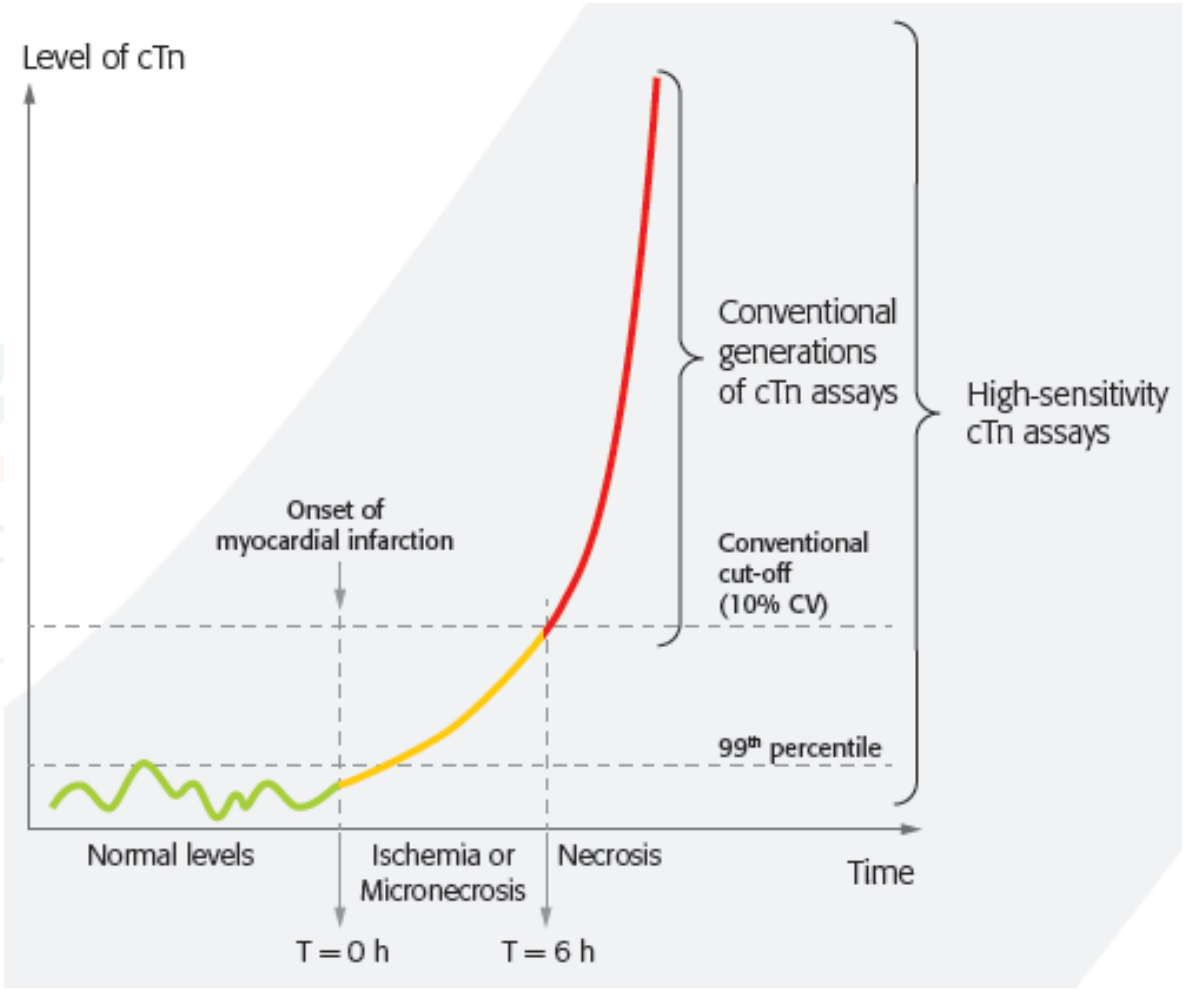
(Miocardical Injury after Non-cardiac Surgery)

Table 1 Currently used definitions of myocardial injury and myocardial infarction and underlying pathophysiological mechanisms. Basel-PMI, Basel Perioperative Myocardial Injury Study; cTn, cardiac troponin; hs-cTnT, high-sensitivity cardiac troponin T; MINS, myocardial injury after noncardiac surgery; SD, standard deviation; URL, upper reference limit; VISION, Vascular Events in Noncardiac Surgery Patients Cohort Evaluation Study.

	Myocardial injury[18]	Acute myocardial injury[18]	Myocardial injury after noncardiac surgery (MINS, VISION definition)[2]	Perioperative myocardial injury (Basel-PMI definition)[34]	Acute myocardial infarction[18]
Criteria for definition	cTn >99th percentile URL for each specific assay	cTn change equal than or greater than 3 SD around measurement of individual assay In patients with initial values > 99th percentile URL, serial changes >20%	Postoperative hs-cTnT concentration 20 to <65 ng L^{-1} with an absolute change of ≥5 ng L^{-1} *or* any postoperative absolute value ≥65 ng L^{-1}	Absolute increase in hs-cTnT >14 ng L^{-1} above preoperative values within 3–7 days of surgery	Increase and decrease in cTn values with at least one value >URL *and* Signs, symptoms, or both of myocardial ischaemia. Type I myocardial infarction: Identification of a coronary thrombus required. Type II myocardial infarction: evidence of myocardial oxygen supply–demand imbalance unrelated to acute coronary atherothrombosis.
Pathophysiology	Causes may be ischaemic or non-ischaemic. May be acute or chronic. Type II myocardial infarction and non-ischaemic myocardial injury may coexist.	Acute, causes may be ischaemic or non-ischaemic. May be difficult to distinguish from Type II myocardial infarction.	Presumed ischaemic causes (i.e. excludes non-ischaemic aetiology such as sepsis, pulmonary embolus, atrial fibrillation, cardioversion, chronic elevation)	Causes may be ischaemic or non-ischaemic, cardiac, or extracardiac (e.g. sepsis and pulmonary embolus)	Cause must be ischaemic and attributable to atherothrombosis (Type I) or oxygen supply–demand imbalance (Type II).

Perioperative troponin surveillance in major noncardiac surgery: a narrative review.
Michelle S. Chew, et al. British Journal of Anaesthesia, 130 (1): 21e28 (2023)

Hs-cTn


Level of cTn
Conventional generations of cTn assays
High-sensitivity cTn assays
Onset of myocardial infarction
Conventional cut-off (10% CV)
99th percentile
Normal levels
Ischemia or Micronecrosis
Necrosis
Time
T = 0 h
T = 6 h

MINS *(Miocardical Injury after Non-cardiac Surgery)*

JAMA | Original Investigation

Association of Postoperative High-Sensitivity Troponin Levels With Myocardial Injury and 30-Day Mortality Among Patients Undergoing Noncardiac Surgery

Postoperative hs-cTnT concentration 20 to < 65 ng L^{-1} with an absolute change of ≥ 5 ng L^{-1} *or* any postoperative absolute value ≥ 65 ng L^{-1}

BJA

British Journal of Anaesthesia, 128 (1): 26–36 (2022)
doi: 10.1016/j.bja.2021.10.006
Advance Access Publication Date: 29 November 2021
Cardiovascular

Identification of myocardial injury using perioperative troponin surveillance in major noncardiac surgery and net benefit over the Revised Cardiac Risk Index

ORIGINAL RESEARCH ARTICLE

Perioperative Myocardial Injury After Noncardiac Surgery

Incidence, Mortality, and Characterization

MINS was defined as an absolute high-sensitivity cardiac troponin T increase of≥14 ng/L from preoperative to postoperative measurements

Table 54. Definition and Diagnostic Criteria of Myocardial Injury After Non-Cardiac Surgery (MINS)
Definition
Myocardial injury due to ischemia that occurs during or within 30 days after non-cardiac surgery
Diagnostic criteria
Rise and fall pattern in postoperative troponin level
No evidence of non-ischemic postoperative complications (e.g., sepsis, pulmonary embolus, atrial fibrillation)
No requirement for ischemic features fulfilling the universal definition of myocardial infarction*: ECG changes, new ventricular wall motion abnormalities on echocardiography, or new ischemic findings on stress myocardial scintigraphy

*Third universal definition of myocardial infarction. Thygesen K, et al. 2012.[397] (Adapted from Smilowitz NR, et al. 2019.[282])

Eiji Hiraoka, et al. JCS 2022 Guideline on Perioperative Cardiovascular Assessment and Management for Non-Cardiac Surgery. Circ J 2023; 87: 1253 – 1337.

MINS *(Miocardical Injury after Non-cardiac Surgery)*

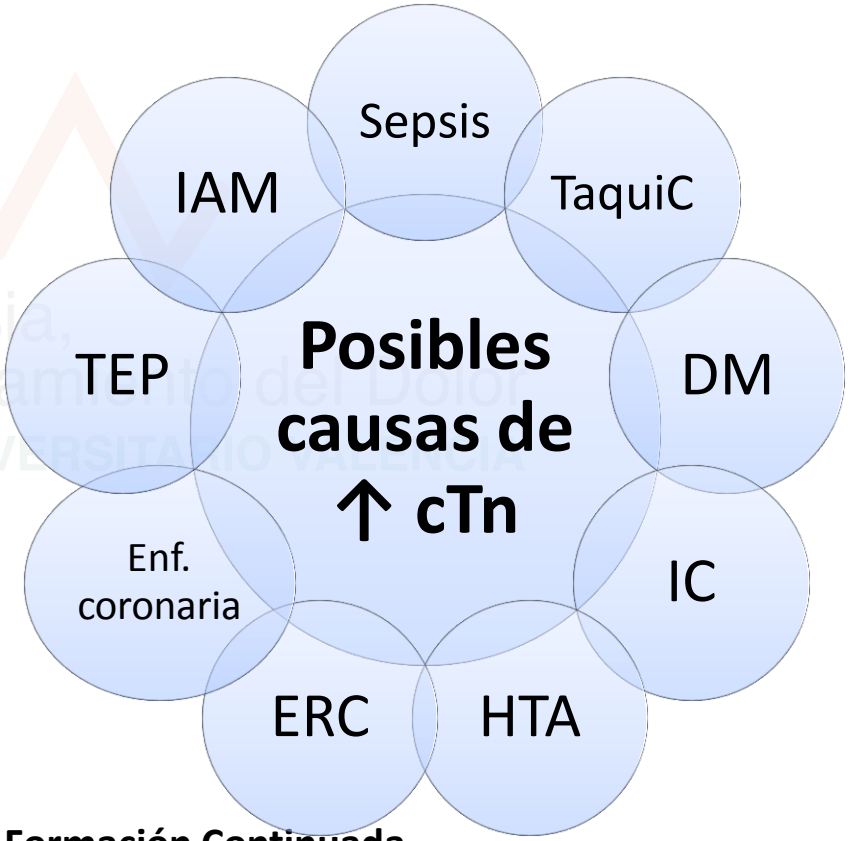
Patogénesis desconocida → Dificultad en diagnóstico precoz → Ausencia de tratamiento dirigido

Perioperative troponin surveillance in major noncardiac surgery: a narrative review.
Michelle S. Chew, et al. British Journal of Anaesthesia, 130 (1): 21e28 (2023)

	Myocardial injury[18]	Acute myocardial injury[18]	Myocardial injury after noncardiac surgery (MINS, VISION definition)[2]	Perioperative myocardial injury (Basel-PMI definition)[34]	Acute myocardial infarction[18]
Pathophysiology	Causes may be ischaemic or non-ischaemic. May be acute or chronic. Type II myocardial infarction and non-ischaemic myocardial injury may coexist.	Acute, causes may be ischaemic or non-ischaemic. May be difficult to distinguish from Type II myocardial infarction.	Presumed ischaemic causes (i.e. excludes non-ischaemic aetiology such as sepsis, pulmonary embolus, atrial fibrillation, cardioversion, chronic elevation)	Causes may be ischaemic or non-ischaemic, cardiac, or extracardiac (e.g. sepsis and pulmonary embolus)	Cause must be ischaemic and attributable to atherothrombosis (Type I) or oxygen supply–demand imbalance (Type II).

Patogénesis desconocida → Dificultad en diagnóstico precoz → Ausencia de tratamiento dirigido

La trombosis no parece ser el principal mecanismo fisiopatológico.



Etiology of Peri-Operative Myocardial Infarction/Injury After Noncardiac Surgery and Associated Outcome

Medición sistemática de troponinas en el perioperatorio.

- ¿Sí o no?
- ¿Cuándo?
- ¿En qué pacientes?
- ¿Con qué objetivo?

GUIDELINES

ESAIC focused guideline for the use of cardiac biomarkers in perioperative risk evaluation

RECOMENDACIONES PREVIAS

	$ESAIC_{2018}$	ESC_{2022}
Determinación preoperatoria aislada	**II-C**	Ø
Determinación aislada postoperatoria (48-72h)	Ø	Ø
Determinación pre y postoperatoria (48-72h)	**II-B**	(Qx de medio-alto R: **I-B**
Valoración del riesgo	NSQIP o RCRI (I-B)	>65a / FRCV / ECVe

GUÍAS ESAIC: ACTUALIZACIÓN 2023

EJA

Eur J Anaesthesiol 2023; **40:**888–927

INFOGRAPHIC

GUIDELINES

ESAIC focused guideline for the use of cardiac biomarkers in perioperative risk evaluation

- Ausencia de puntos de corte claros de concentraciones de hs-cTn
- Ausencia de modelos predictivos de mortalidad
- Falta de estudios de impacto a nivel médico, individual, organizativo y económico.

Coste efectividad

ESC
European Society of Cardiology

→ “Datos recientes indican que la búsqueda de daño o infarto de miocardio es costo-efectiva”.

Troponin T monitoring to detect myocardial injury after noncardiac surgery: a cost–consequence analysis

GUÍAS ESAIC: ACTUALIZACIÓN 2023

EJA

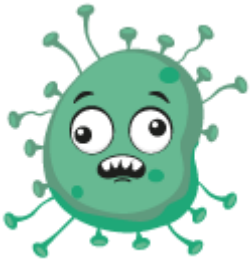
Eur J Anaesthesiol 2023; **40**:888–927

INFOGRAPHIC

GUIDELINES

ESAIC focused guideline for the use of cardiac biomarkers in perioperative risk evaluation

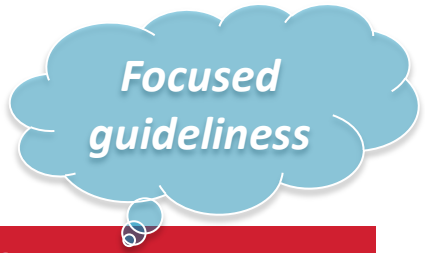
Focused Guideliness



***Infodemic**: Too much information including false or misleading information in digital and physical environments during a disease outbreak. It causes confusion and risk-taking behaviours that can harm health.*

- Más cortas.
- Más dirigidas a un tema en concreto.
- Misma metodología = mismo nivel de evidencia científica.

Sistema GRADE



Grade of recommendation	Clarity of risk/benefit	Quality of supporting evidence
1A: Strong recommendation, high-quality evidence	Benefits clearly outweigh risk and burdens, or *vice versa*.	Consistent evidence from well performed randomised, controlled trials or over-whelming evidence of some other form. Further research is unlikely to change our confidence in the estimate of benefit and risk.
1B: Strong recommendation, moderate-quality evidence	Benefits clearly outweigh risk and burdens, or *vice versa*.	Evidence from randomised, controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other research design. Further research (if performed) is likely to have an impact on our confidence in the estimate of benefit and risk and may change the estimate
1C: Strong recommendation, low-quality evidence	Benefits appear to outweigh risk and burdens, or vice versa.	Evidence from observational studies, unsystematic clinical experience, or from randomised controlled trials with serious flaws. Any estimate of effect is uncertain.
2A: Weak recommendation, high quality evidence	Benefits closely balanced with risks and burdens.	Consistent evidence from well performed randomised controlled trials or overwhelming evidence of some other form. Further research is unlikely to change our confidence in the estimate of benefit and risk.
2B: Weak recommendation, moderate-quality evidence	Benefits closely balanced with risks and burdens, some uncertainly in the estimates of benefits, risks and burdens.	Evidence from randomised controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other research design. Further research (if performed) is likely to have an impact on our confidence in the estimate of benefit and risk and may change the estimate.
2C: Weak recommendation, low-quality evidence	Uncertainty in the estimates of benefits, risks and burdens benefits may be closely balanced with risks and burdens.	Evidence from observational studies, unsystematic clinical experience, or from randomised controlled trials with serious flaws. Any estimate of effect is uncertain.

Eur J Anaesthesiol 2022; **39:**1–13

Uso de las troponinas…

…como factor pronóstico

…como un predictor de riesgo Qx

…para manejo guiado por biomarcadores

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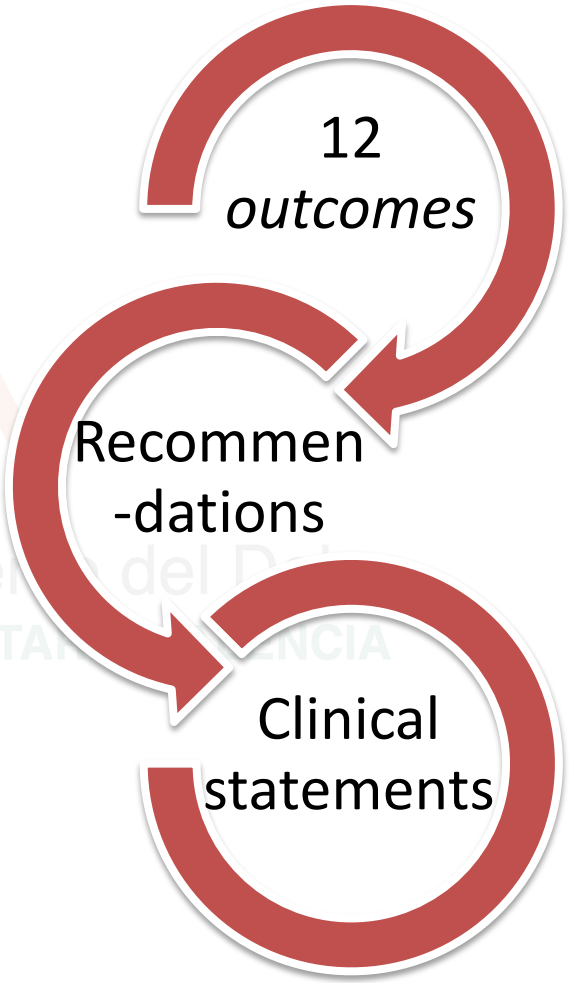
Presentación de resultados



Clinical outcomes

Mortalidad de cualquier causa hasta 30 días	Mortalidad de cualquier causa hasta 1 año	Complicaciones cardíacas hasta 30 días
Efecto adverso cardíaco mayor hasta 30 días	Efecto adverso cardíaco mayor hasta 1 año	Complicaciones de cualquier índole hasta 30 días
Muerte o IAM hasta 30 días	Muerte o IAM hasta 1 año	Discapacidad a corto plazo (hasta 90 días)
Mortalidad de origen cardíaco hasta 30 días	Daño miocárdico hasta 30 días	Calidad de vida a corto plazo (hasta 90 días)

Clinical outcomes

Mortalidad de cualquier causa hasta 30 días	**Mortalidad de cualquier causa hasta 1 año**	Complicaciones cardíacas hasta 30 días
Efecto adverso cardíaco mayor hasta 30 días	Efecto adverso cardíaco mayor hasta 1 año	Complicaciones de cualquier índole hasta 30 días
Muerte o IAM hasta 30 días	~~Muerte o IAM hasta 1 año~~	~~Discapacidad a corto plazo (hasta 90 días)~~
Mortalidad de origen cardíaco hasta 30 días	~~Daño miocárdico hasta 30 días~~	~~Calidad de vida a corto plazo (hasta 90 días)~~

O: High-Mod
O: Low
O: Very low
~~O~~: Ø

Troponinas PREoperatorias

☼¿Factor pronóstico? → Débil – muy bajo.

☼¿Predictor de riesgo? → Ø Rec. – muy bajo.

☼¿Manejo guiado? → Ø Rec. – Ø evidencia.

Troponinas PREoperatorias

Solo 1 *outcome* con alto nivel de evidencia. El resto bajo, muy bajo o ausente.

Table 1 Evidence summary for stand-alone preoperative cardiac troponins. The left column indicates the overall certainty of evidence for all 12 outcomes

Preoperative (stand-alone) cardiac troponins			Certainty of the evidence (GRADE)		
	Outcome	Relative importance	Prognostic factor	Risk prediction	Biomarker-enhanced management
	All-cause mortality at 30 days	Critical	⊕⊕⊕⊕ High[4–6,17]	⊕◯◯◯ Very low[3]	No data
	All-cause mortality up to 1 year	Critical	⊕◯◯◯ Very low[7–10,19]	No data	No data
○ No included studies	Cardiac mortality up to 30 days	Critical	No data	No data	No data
◐ Very low	Death or myocardial infarction up to 30 days	Critical	No data	No data	No data
○ Low	Death or myocardial infarction up to 1 year	Critical	No data	No data	No data
○ Moderate	Major adverse cardiac events up to 30 days	Critical	⊕⊕◯◯ Low[3,10-14]	⊕◯◯◯ Very low[26-28]	No data
○ High	Major adverse cardiac events* up to 1 year	Critical	⊕◯◯◯ Very low[9,10,14,15]	⊕◯◯◯ Very low[10,15]	No data
	Cardiac complications (any severity) up to 30 days	Critical	⊕⊕◯◯ Low[9,16]	⊕◯◯◯ Very low[16]	No data
	Myocardial injury up to 30 days	Critical	No data	No data	No data
	Complications (cardiac and non-cardiac) up to 30 days	Critical	⊕◯◯◯ Very low[17]	No data	No data
	Short-term disability? (up to 90 days)	Critical	No data	No data	No data
	Short-term QoL (up to 90 days)	Critical	No data	No data	No data

Troponinas PREoperatorias

Solo 1 *outcome* con alto nivel de evidencia. El resto bajo, muy bajo o ausente.

- Consecuencias por estudiar
- Ausencia de manejo posterior

Troponinas PREoperatorias

☼¿Factor pronóstico? → Débil – muy bajo.

☼¿Predictor de riesgo? → Ø Rec. – muy bajo.

☼¿Manejo guiado? → Ø Rec. – Ø evidencia.

Table 1 Evidence summary for stand-alone preoperative cardiac troponins. The left column indicates the overall certainty of evidence for all 12 outcomes

Preoperative (stand-alone) cardiac troponins			Certainty of the evidence (GRADE)		
	Outcome	Relative importance	Prognostic factor	Risk prediction	Biomarker-enhanced management
	All-cause mortality at 30 days	Critical	⨁⨁⨁⨁ High[4–6,17]	⨁◯◯◯ Very low[3]	No data
	All-cause mortality up to 1 year	Critical	⨁◯◯◯ Very low[7–10,19]	No data	No data
○ No included studies	Cardiac mortality up to 30 days	Critical	No data	No data	No data
◐ Very low	Death or myocardial infarction up to 30 days	Critical	No data	No data	No data
○ Low	Death or myocardial infarction up to 1 year	Critical	No data	No data	No data
○ Moderate	Major adverse cardiac events up to 30 days	Critical	⨁⨁◯◯ Low[3,10-14]	⨁◯◯◯ Very low[26-28]	No data
○ High	Major adverse cardiac events* up to 1 year	Critical	⨁◯◯◯ Very low[9,10,14,15]	⨁◯◯◯ Very low[10,15]	No data
	Cardiac complications (any severity) up to 30 days	Critical	⨁⨁◯◯ Low[9,16]	⨁◯◯◯ Very low[16]	No data
	Myocardial injury up to 30 days	Critical	No data	No data	No data
	Complications (cardiac and non-cardiac) up to 30 days	Critical	⨁◯◯◯ Very low[17]	No data	No data
	Short-term disability? (up to 90 days)	Critical	No data	No data	No data
	Short-term QoL (up to 90 days)	Critical	No data	No data	No data

Troponinas PREop[illegible]as

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CONCLUSION

RUO

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Troponinas POSToperatorias

☼¿Factor pronóstico? → Débil – moderado.

☼¿Predictor de riesgo? → Débil – bajo.

☼¿Manejo guiado? → Ø Rec. – muy bajo.

Uso como factor pronóstico

- **Abundante literatura con troponinas clásicas.**
- **El más grande (VISION): 22.000 pacientes. Uso de Tn de alta sensibilidad.**

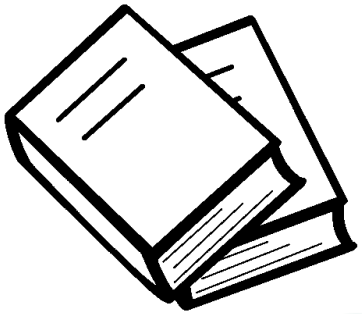
↑ cTn = FR mortalidad

Mayor concentración = Mayor riesgo

Table 3 Evidence summary for postoperative cardiac troponins. The left column indicates the overall certainty of evidence for all 12 outcomes

Postoperative cardiac troponins			Quality of the evidence (GRADE)		
	Outcome	Relative importance	Prognostic factor	Risk prediction	Biomarker-enhanced management
	All-cause mortality at 30 days	Critical	⊕⊕⊕⊕ High[30-42]	⊕⊕⊕⊕ High[30–32,41-44]	⊕◯◯◯ Very low[114,115]
	All-cause mortality up to 1 year	Critical	⊕⊕⊕◯ Moderate[8,24,33,40,42,45-53]	⊕◯◯◯ Very low[24,42]	⊕◯◯◯ Very low[116,117]
○ No included studies	Cardiac mortality up to 30 days	Critical	No data	No data	⊕◯◯◯ Very low[117]
○ Very low	Death or myocardial infarction up to 30 days	Critical	⊕◯◯◯ Very Low[35,54]	No data	No data
◉ Low	Death or myocardial infarction up to 1 year	Critical	No data	No data	No data
○ Moderate	Major adverse cardiac events up to 30 days	Critical	⊕◯◯◯ Very Low[31,33,42,55]	⊕⊕◯◯ Low[29,40,42,55]	No data
○ High	Major adverse cardiac events* up to 1 year	Critical	⊕⊕◯◯ Low[8,42,45,49,56]	No data	No data
	Cardiac complications (any severity) up to 30 days	Critical	No data	No data	No data
	Myocardial injury up to 30 days	Critical	Not applicable	Not applicable	Not applicable
	Complications (cardiac and non-cardiac) up to 30 days	Critical	⊕⊕◯◯ Low[42,57,58]	⊕◯◯◯ Very low[58]	No data
	Short-term disability? (up to 90 days)	Critical	No data	No data	No data
	Short-term QoL (up to 90 days)	Critical	No data	No data	No data

Uso como predictor de riesgo



- **Estudios prospectivos en distintas cirugías.**
- **El más grande: 50.000 pacientes.**

REPORTS OF ORIGINAL INVESTIGATIONS

Use of clinically based troponin underestimates the cardiac injury in non-cardiac surgery: a single-centre cohort study in 51,701 consecutive patients

Conclusions: (…) A postoperative measurement protocol provides a **threefold increase** in the ability to detect myocardial injury. (…) in patients with a low mortality risk, cardiac injury is low and there is minimal improvement in the ability to detect cardiac injury (…). These findings suggest that a surveillance protocol of troponin I would be optimal when limited to moderate to high-risk patients.

Table 3 Evidence summary for postoperative cardiac troponins. The left column indicates the overall certainty of evidence for all 12 outcomes

Postoperative cardiac troponins			Quality of the evidence (GRADE)		
	Outcome	Relative importance	Prognostic factor	Risk prediction	Biomarker-enhanced management
	All-cause mortality at 30 days	Critical	⨁⨁⨁⨁ High[30-42]	⨁⨁⨁⨁ High[30–32,41-44]	⨁◯◯◯ Very low[114,115]
	All-cause mortality up to 1 year	Critical	⨁⨁⨁◯ Moderate[8,24,33,40,42,45-53]	⨁◯◯◯ Very low[24,42]	⨁◯◯◯ Very low[116,117]
○ No included studies	Cardiac mortality up to 30 days	Critical	No data	No data	⨁◯◯◯ Very low[117]
○ Very low	Death or myocardial infarction up to 30 days	Critical	⨁◯◯◯ Very Low[35,54]	No data	No data
◉ Low	Death or myocardial infarction up to 1 year	Critical	No data	No data	No data
○ Moderate	Major adverse cardiac events up to 30 days	Critical	⨁◯◯◯ Very Low[31,33,42,55]	⨁⨁◯◯ Low[29,40,42,55]	No data
○ High	Major adverse cardiac events* up to 1 year	Critical	⨁⨁◯◯ Low[8,42,45,49,56]	No data	No data
	Cardiac complications (any severity) up to 30 days	Critical	No data	No data	No data
	Myocardial injury up to 30 days	Critical	Not applicable	Not applicable	Not applicable
	Complications (cardiac and non-cardiac) up to 30 days	Critical	⨁⨁◯◯ Low[42,57,58]	⨁◯◯◯ Very low[58]	No data
	Short-term disability? (up to 90 days)	Critical	No data	No data	No data
	Short-term QoL (up to 90 days)	Critical	No data	No data	No data

Table 3 Evidence summary for postoperative cardiac troponins. The left column indicates the overall certainty of evidence for all 12 outcomes

Postoperative cardiac troponins			Quality of the evidence (GRADE)		
	Outcome	Relative importance	Prognostic factor	Risk prediction	Biomarker-enhanced management
	All-cause mortality at 30 days	Critical	⨁⨁⨁⨁ High[30-42]	⨁⨁⨁⨁ High[30–32,41-44]	⨁◯◯◯ Very low[114,115]
	All-cause mortality up to 1 year	Critical	⨁⨁⨁◯ Moderate[8,24,33,40,42,45-53]	⨁◯◯◯ Very low[24,42]	⨁◯◯◯ Very low[116,117]
○ No included studies	Cardiac mortality up to 30 days	Critical	No data	No data	⨁◯◯◯ Very low[117]
○ Very low	Death or myocardial infarction up to 30 days	Critical	⨁◯◯◯ Very Low[35,54]	No data	No data
◉ Low	Death or myocardial infarction up to 1 year	Critical	No data	No data	No data
○ Moderate	Major adverse cardiac events up to 30 days	Critical	⨁◯◯◯ Very Low[31,33,42,55]	⨁⨁◯◯ Low[29,40,42,55]	No data
○ High	Major adverse cardiac events* up to 1 year	Critical	⨁⨁◯◯ Low[8,42,45,49,56]	No data	No data
	Cardiac complications (any severity) up to 30 days	Critical	No data	No data	No data
	Myocardial injury up to 30 days	Critical	Not applicable	Not applicable	Not applicable
	Complications (cardiac and non-cardiac) up to 30 days	Critical	⨁⨁◯◯ Low[42,57,58]	⨁◯◯◯ Very low[58]	No data
	Short-term disability? (up to 90 days)	Critical	No data	No data	No data
	Short-term QoL (up to 90 days)	Critical	No data	No data	No data

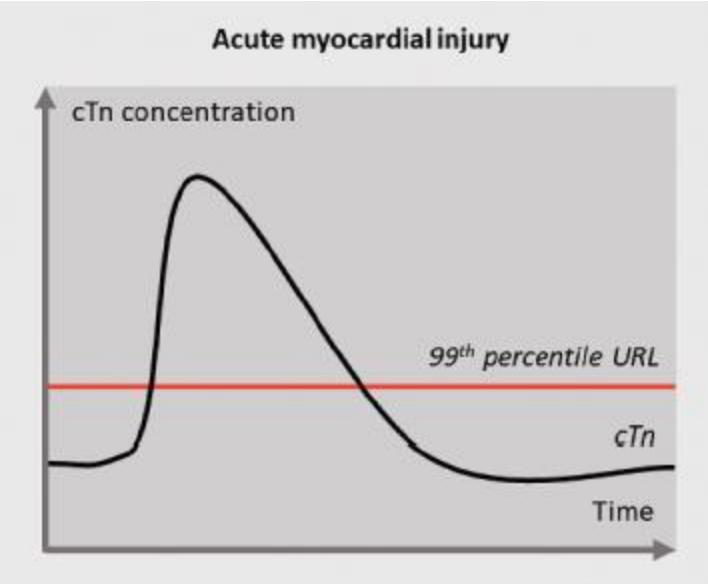
Troponinas PRE y POST operatorias

☼¿Factor pronóstico? → Débil – moderado.

☼¿Predictor de riesgo? → Débil – muy bajo.

☼¿Manejo guiado? → Ø Rec. – muy bajo.

¿Ventajas?


Acute myocardial injury
cTn concentration
99th percentile URL
cTn
Time

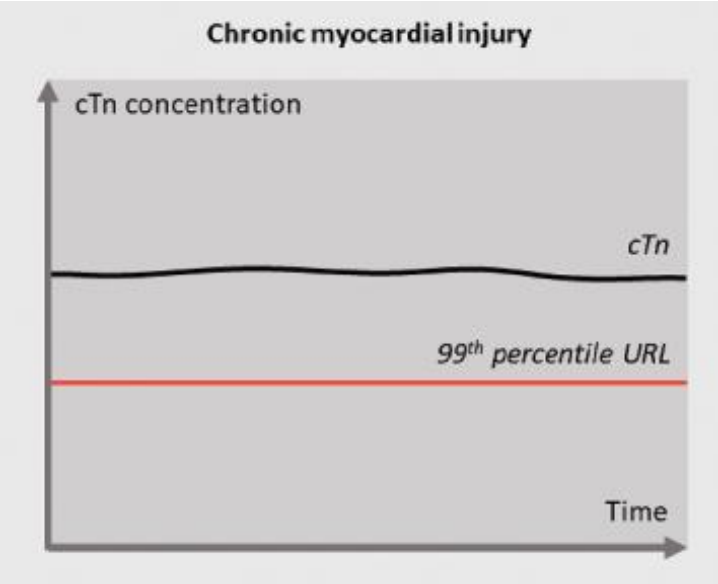

Chronic myocardial injury
cTn concentration
cTn
99th percentile URL
Time

Table 2 Evidence summary for combined pre- and postoperative cardiac troponins. The left column indicates the overall certainty of evidence for all 12 outcomes

Combined (pre- and postoperative) cardiac troponins			Certainty of the evidence (GRADE)		
	Outcome	Relative importance	Prognostic factor	Risk prediction	Biomarker-enhanced management
	All-cause mortality at 30 days	Critical	⊕⊕⊕⊕ High[18,19,21]	⊕⊕◯◯ Low[18]	⊕◯◯◯ Very low[19,20]
	All-cause mortality up to 1 year	Critical	⊕⊕⊕◯ Moderate[19,21-24]	No data	⊕◯◯◯ Very low[19]
○ No included studies	Cardiac mortality up to 30 days	Critical	No data	No data	No data
○ Very low	Death or myocardial infarction up to 30 days	Critical	No data	No data	No data
◉ Low	Death or myocardial infarction up to 1 year	Critical	No data	No data	No data
○ Moderate	Major adverse cardiac events up to 30 days	Critical	⊕⊕⊕⊕ High[25,26]	⊕⊕⊕◯ Moderate[26,29]	No data
○ High	Major adverse cardiac events* up to 1 year	Critical	⊕⊕◯◯ Low[25]	No data	No data
	Cardiac complications (any severity) up to 30 days	Critical	No data	No data	No data
	Myocardial injury up to 30 days	Critical	No data	No data	No data
	Complications (cardiac and non-cardiac) up to 30 days	Critical	⊕◯◯◯ Very low[58]	No data	No data
	Short-term disability (up to 90 days)	Critical	No data	No data	No data
	Short-term QoL (up to 90 days)	Critical	No data	No data	No data

Table 2 Evidence summary for combined pre- and postoperative cardiac troponins. The left column indicates the overall certainty of evidence for all 12 outcomes

Combined (pre- and postoperative) cardiac troponins			Certainty of the evidence (GRADE)		
	Outcome	Relative importance	Prognostic factor	Risk prediction	Biomarker-enhanced management
			⊕⊕⊕⊕ High[18,19,21]	⊕⊕◯◯ Low[18]	⊕◯◯◯ Very low[19,20]
			⊕⊕⊕◯ Moderate[19,21-24]	No data	⊕◯◯◯ Very low[19]
○ No i			No data	No data	No data
○ Very			No data	No data	No data
◐ Low			No data	No data	No data
○ Moderate	Major adverse cardiac events up to 30 days	Critical	⊕⊕⊕⊕ High[25,26]	⊕⊕⊕◯ Moderate[26,29]	No data
○ High			⊕⊕◯◯ Low[25]	No data	No data
			No data	No data	No data
			No data	No data	No data
			⊕◯◯◯ Very low[58]	No data	No data
			No data	No data	No data
	Short-term QoL (up to 90 days)	Critical	No data	No data	No data

→ **La determinación combinada de hs-cTn es útil en la predicción del riesgo.**
- **Valor añadido al RCRI (mort. 30d)**
- **Independientemente del valor del RCRI (ef. adv. mayores 30d.)**

Does cardiology intervention improve mortality for post-operative cTn elevations after emergency orthopaerdic - geriatric surgery? A randomised controlled study.
Carol P. Chong, et al. 2012.

→ **No diferencias entre tratamiento en sala de referencia o manejo por cardiología.**

Dabigatran in patients with myocardial injury after non-cardiac surgery (MANAGE): an international, randomised, placebo-controlled trial

P J Devereaux, Emmanuelle Duceppe, Gordon Guyatt, Vikas Tandon, Reitze Rodseth, Bruce M Biccard, Denis Xavier, Wojciech Szczeklik, Christian S Meyh… …gala Rao, Prashant V Rahat… …arlos Villar, Fernando Botto, J… …ngdiwala, Purnima Rao-Me…

Among patients who had MINS, dabigatran 110 mg twice daily lowered the risk of major vascular complications, with no significant increase in major bleeding

- Ensayo

- No incl

→ O… …mayores”

→ *M*

- Valorar dabigatran 110 mg cad 12h. en pacientes con riesgo de complicaciones vasculares mayores en los primeros 12 meses.

Troponinas post y pre+post operatorias.

SARTD-CHGUV Sesión de Formación Continuada
Valencia, 5 de marzo de 2024

RECOMENDACIONES PREVIAS

Canadian Journal of Cardiology 33 (2017) 17–32

Society Guidelines

Canadian Cardiovascular Society Guidelines on Perioperative Cardiac Risk Assessment and Management for Patients Who Undergo Noncardiac Surgery

→Determinación diaria durante 2-3 días post cirugía:

- ✓ BNP/NT-proBNP elevado previo a la cirugía
- ✓ RCRI score ≥ 1
- ✓ >5% de riesgo para eventos cardiovasculares mayores en 30 días (VISION-2)
  - → ≥ 65 años
  - → 45-64 años + enfermedad cardiovascular conocida

Rec. FUERTE **2B**
Niv. Ev. MODERADO

RECOMENDACIONES PREVIAS

Circulation Journal
Circ J 2023; 87: 1253–1337
doi:10.1253/circj.CJ-22-0609

JCS GUIDELINES

JCS 2022 Guideline on Perioperative Cardiovascular Assessment and Management for Non-Cardiac Surgery

- **¿Cuándo?** *"High risk" ≈ Basal risk >5% Canadian Guideliness*

Table 55. Recommendations and Levels of Evidence on Postoperative Troponin and ECG Monitoring

	COR	LOE
Postoperative MINS surveillance by myocardial troponin may be considered for high-risk patients	IIb	C

IIB: Effectiveness/usefulness is not well established based on evidence and opinion

C: Consensus from expert opinion and/or small clinical trials (including retrospective studies and case series)

Eva Álvarez, et al. Effect of a national guideline on postoperative troponin surveillance: A retrospective cohort study in a single institution in Canada. 2023.

- Cohorte 36.386 pacientes (2016-2021).
- Determinación de troponinas: 13% vs 57%.

- No diferencias significativas en nº determinaciones pre y post guía.
- Adición de troponinas no aporta un valor añadido para la detección de *outcomes*.

Troponinas	NT-proBNP
Más ampliamente disponibles	
Menos costosa	
Más VPN	
Diagnóstico precoz	
	Ensayos clínicos: el diagnóstico y la intensificación de la terapia basados en los niveles de BNP/pro-BNP mejora los resultados perioperatorios
	Diagnóstico de IC inadvertida en pacientes ancianos.

Recomendaciones NT-proBNP

Determinación preoperatoria

Recommendation	Strength of recommendation and certainty of evidence
We suggest that routine measurement of preoperative B-type natriuretic peptides may be used to help evaluate the risk of some adverse outcomes in non-cardiac surgery.	Weak Moderate
We suggest that the addition of preoperative B-type natriuretic peptides to clinical risk scores might be used to improve the prediction of some postoperative events, in particular 30-day major adverse cardiac events.	Weak Very low
The use of preoperative BNP/NT-proBNP-enhanced management to improve outcomes should be limited to the context of clinical research.	No recommendation No data

"Clinical statements"
BNP/NT-proBNP preoperatorio

1. *Based on **moderate to high certainty evidence for** some critical outcomes, preoperative BNP/NT-proBNP may be used to help evaluate risk of adverse events (i.e. **prognosis**), **in** particular **30-day MACE**, **30-day death** and **myocardial infarction**, to inform patients and encourage shared decision-making.*
2. *Based on **low certainty of evidence for risk prediction** for the majority of the 12 outcomes and the **lack of evidence for BNP/NT-proBNP-enhanced management**, preoperative B-type natriuretic peptides **should not be used on a routine basis to guide clinical decisions**.*
3. *Of note this does not preclude the use of BNP/NT-proBNP measurement preoperatively upon clinical suspicion based on clinical signs or symptoms, e.g. dyspnoea, hypoxia, to detect and manage heart failure.*
4. *Clinicians should be aware that different B-type natriuretic peptide assays are commercially available and ensure that appropriate cut-off and interpretation are used.*

Recomendaciones NT-proBNP

Determinación postoperatoria

Recommendation	Strength of recommendation and certainty of evidence
Routine measurement of postoperative BNP/NT-proBNP to help evaluate the risk of adverse outcomes should only be used in the context of clinical research.	No recommendation Very low
The routine addition of BNP/NT-proBNP to clinical risk scores to improve the prediction of postoperative events should only be used in the context of clinical research.	No recommendation Very low
The use of postoperative BNP/NT-proBNP-enhanced management to improve outcomes should only be used in the context of clinical research.	No recommendation No data

"Clinical statements"
BNP/NT-proBNP postoperatorio

1. *Based on **lack of evidence** for prognosis, risk prediction and B-type natriuretic peptide-enhanced management for the majority of the 12 outcomes, **systematic postoperative BNP/NT-proBNP measurement should not be used on a routine basis to guide clinical decisions.***
2. *Of note, this does not preclude the use of BNP/NT-proBNP measurement postoperatively upon clinical suspicion based on clinical signs or symptoms, e.g. dyspnoea, hypoxia, to detect and manage heart failure.*
3. *Clinicians should be aware that different B-type natriuretic peptide assays are commercially available and ensure that appropriate cut-off and interpretation are used.*

Conclusiones

- Hay un interés creciente en el *MINS* en las sociedades científicas.

- Una elevación de troponinas en el perioperatorio es un factor de riesgo independiente de mortalidad a corto y medio plazo.

- La determinación sistemática de forma aislada de troponinas en el preoperatorio solo se recomienda en el contexto de estudios clínicos.

- La combinación del nivel de troponinas preoperatorio y postoperatorio nos permite diferenciar daño miocárdico agudo de crónico.

Conclusiones

- El uso tanto la determinación sistemática de troponinas en el postoperatorio de forma aislada como combinadas con una determinación preoperatoria parece razonable para mejorar la clasificación de riesgo de los pacientes y especialmente para implicaciones pronósticas.

- El nivel de troponinas postoperatorias se relaciona de forma directamente proporcional con la mortalidad a corto y medio plazo.

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