

Innsbrucker Forum für Intensivmedizin und Pflege (IFIMP)

UNIVERSITÄTSKLINIKUM
TULLN

KARL
LANDSTEINER **KL**
PRIVATUNIVERSITÄT FÜR
GESUNDHEITSWISSENSCHAFTEN

Intensivmedizin - ist ALLES möglich? 9. - 10. April 2025

Präoperative Leistungsoptimierung: Warum - Was - Wann - Wie?

Prim. Prof. PD. Dr. Andreas Duma, MSc, MBA, FESAIC

Klinische Abteilung für Anästhesie und Intensivmedizin,
Leiter der ARGE präoperatives und tagesklinisches Patientenmanagement (ÖGARI)

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Warum Prehab?

Stellen Sie sich vor....

...Sie müssen in 6 Wochen einen Halbmarathon laufen.



Central Park, NYC

Warum Prehab?

Stellen Sie sich vor....

...Sie müssen in 6 Wochen einen Halbmarathon laufen.

...und danach den Jakobsweg gehen.



Unfit

Anaerobic threshold in der blauen Zone

CARDIOVASCULAR

Physiological relationship between cardiorespiratory fitness and fitness for surgery: a narrative review

Brendon H. Roxburgh^{1,2,*}, James D. Cotter², Holly A. Campbell¹, Ulla Reymann¹, Luke C. Wilson³, David Gwynne-Jones^{1,4}, Andre M. van Rij¹ and Kate N. Thomas¹

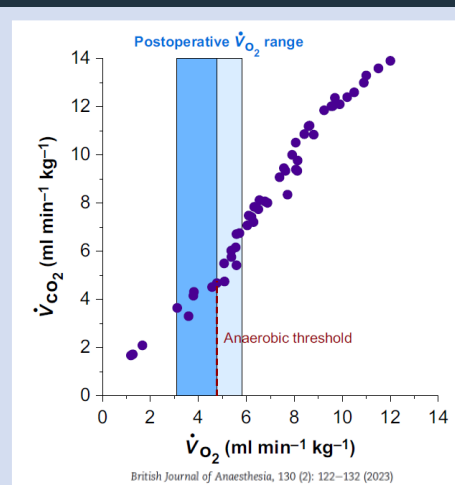


Fig 2. Example cardiopulmonary exercise test output for a patient with low preoperative peak $\dot{V}O_2$ ($\sim 12 \text{ ml min}^{-1} \text{ kg}^{-1}$) and anaerobic threshold ($\sim 5 \text{ ml min}^{-1} \text{ kg}^{-1}$; red dashed line). The blue zone represents a typical range of postoperative $\dot{V}O_2$ values after major surgery; for this patient, the upper limit of this range is above their anaerobic threshold.

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Präoperative Leistungsoptimierung



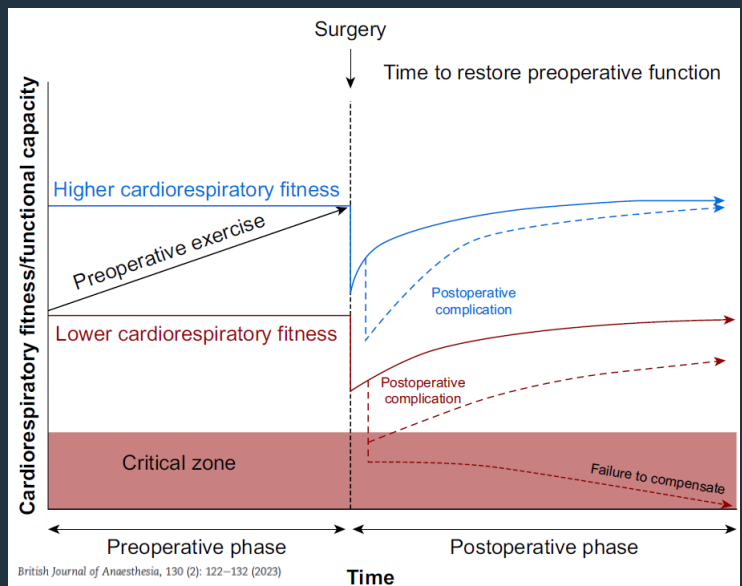
Fit

Präoperative Optimierung erhöht postoperative Reserven

CARDIOVASCULAR

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Brendon H. Roxburgh^{1,2,*}, James D. Cotter², Holly A. Campbell¹, Ulla Reymann¹, Luke C. Wilson³, David Gwynne-Jones^{1,4}, Andre M. van Rij¹ and Kate N. Thomas¹



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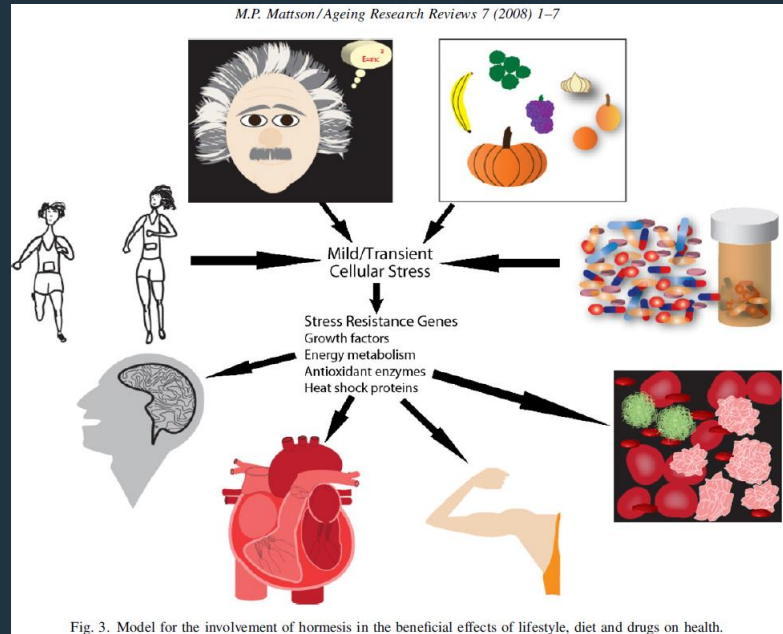
Präoperative Leistungsoptimierung



Hormesis

Adaptive Stressantwort

„Ein Prozess, bei dem die Exposition gegenüber einer niedrigen Dosis eines chemischen Stoffes oder Umweltfaktors, der in höheren Dosen schädlich ist, eine adaptive, vorteilhafte Wirkung auf die Zelle oder den Organismus hervorruft.“



Mark P. Mattson, Hormesis defined, Ageing Research Reviews, Volume 7, Issue 1, 2008, Pages 1–7,

Cross-tressor Adaptation

Körperliches Training verbessert auch ...

...mentale Resilienz
 ...neuroendokrine Reaktion
 ...inflammatorische Reaktion
 ...metabolische Flexibilität

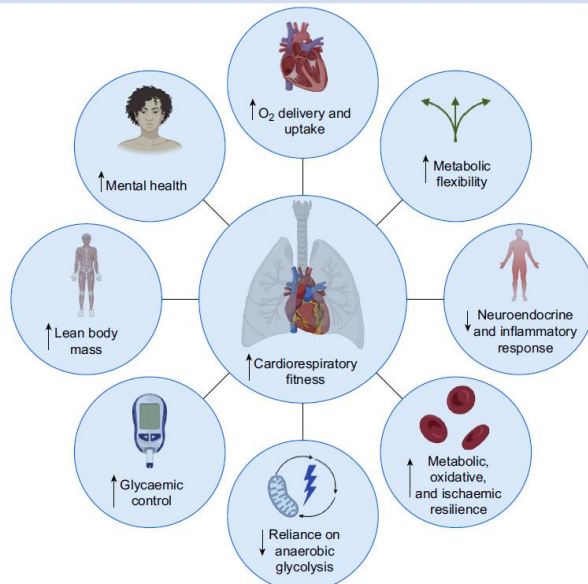
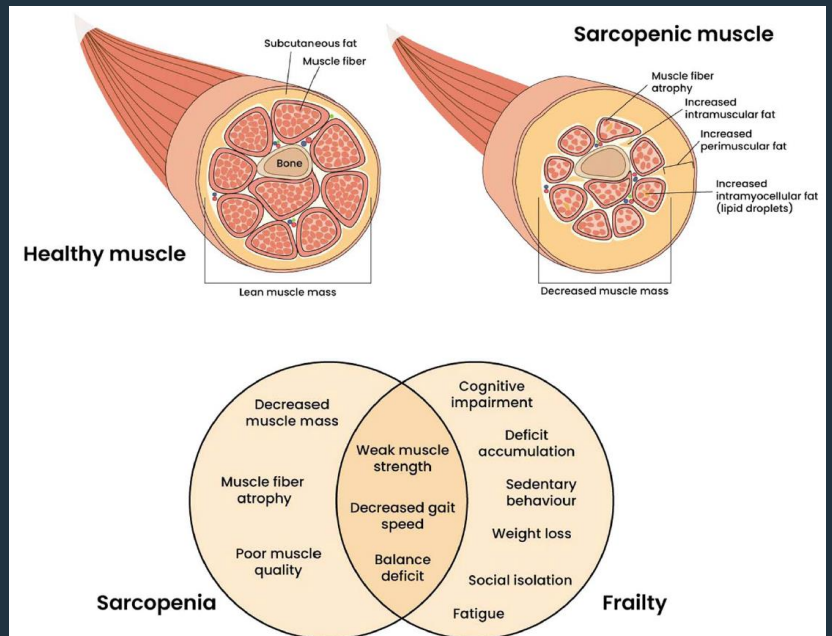


Fig 3. Physiological and psychological effects associated with higher cardiorespiratory fitness that likely improve fitness for surgery.

Lean Body Mass, Sarcopenia & Frailty

Knoedler S, Schliermann R, Knoedler L, Wu M, Hansen FJ, Matar DY, Obed D, Vervoort D, Haug V, Hundeshagen G, Paik A, Kauke-Navarro M, Kneser U, Pomahac B, Orgill DP, Panayi AC. Impact of sarcopenia on outcomes in surgical patients: a systematic review and meta-analysis. Int J Surg. 2023 Dec 1;109(12):4238-4262.



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Präoperative Leistungsoptimierung



Sarcopenia und Outcome

Analysis of primary outcomes.

Outcome	Studies	Patients (events)		OR (95% CI)	P	I ² (%)
		With sarcopenia	Without sarcopenia			
Mortality	154	21 122 (5599)	40 236 (8119)	2.69 (2.31–3.12)	< 0.00001	79 (< 0.00001)
Any complications	160	16 859 (6660)	33 534 (8993)	1.68 (1.51–1.87)	< 0.00001	79 (< 0.00001)
Home discharge	21	2720 (1833)	5338 (4257)	0.50 (0.40–0.63)	< 0.00001	67 (< 0.00001)
1-Year	34	3560 (2785)	8814 (7935)	0.45 (0.38–0.53)	< 0.00001	39 (0.01)
3-Year	11	1245 (721)	2618 (1839)	0.44 (0.31–0.61)	< 0.00001	69 (0.0003)
5-Year	14	1563 (993)	1666 (1260)	0.55 (0.46–0.65)	< 0.00001	18 (0.25)
Patients						
LOHS	64	7377	14 385	MD (95% CI) 1.68 (1.18–2.17)	< 0.00001	90 (< 0.00001)
Operative time	40	3350	5792	1.68 (–5.62 to 8.98)	0.65	79 (< 0.00001)

Odds ratio estimates (OR) and mean differences (MD) with 95% confidence intervals (CI). Patients with sarcopenia were more likely to experience complications and mortality, had longer hospital stays, and were less likely to be discharged home. Operative time did not differ between the two cohorts. A direct significant correlation between the presence of sarcopenia and lower survival rates at 1, 3, and 5 years was noted.

294 Studien

97.643 Patientinnen und Patienten

Knoedler S, Schliermann R, Knoedler L, Wu M, Hansen FJ, Matar DY, Obed D, Vervoort D, Haug V, Hundeshagen G, Paik A, Kauke-Navarro M, Kneser U, Pomahac B, Orgill DP, Panayi AC. Impact of sarcopenia on outcomes in surgical patients: a systematic review and meta-analysis. Int J Surg. 2023 Dec 1;109(12):4238-4262.

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Präoperative Leistungsoptimierung



Adipositas

Die richtige OP-Vorbereitung

Was bringt eine kalorienarme und proteinreiche «Spezial-Diät» vor der bariatrischen Operation? Eine solche «Spezial-Diät» kann sehr viel bringen!



<https://www.adipositaszentrum-limmattal.ch/blog/2020/05/13/die-richtige-op-vorbereitung/>

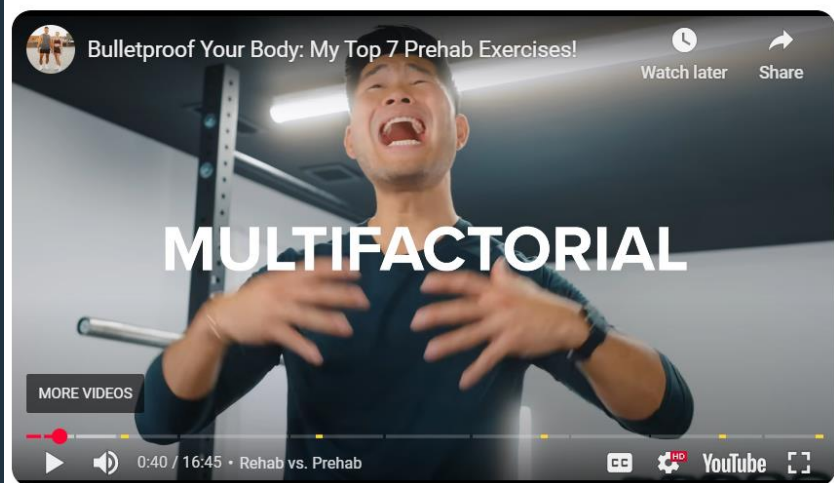
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Jason says....

Bulletproof Your Body: My Top 7 Prehab Exercises!

YouTube · Jason and Lauren · 30.11.2024



12 // Präoperative Leistungsoptimierung



Wie können wir Patientinnen und Patienten
präoperativ körperlich, mental, kognitiv und
diätologisch vorbereiten um den postoperativen
Verlauf zu verbessern?

Identifying research priorities in anaesthesia and perioperative care.
Boney O, Bell M, Bell N, et al *BMJ Open* 2015;8:e010006.

Relative efficacy of prehabilitation interventions and their components: systematic review with network and component network meta-analyses of randomised controlled trials

[thebmj](#) | *BMJ* 2025;388:e081164 | doi: 10.1136/bmj-2024-081164

Daniel I McIsaac,¹ Gurlavine Kidd,² Chelsia Gillis,³ Karina Branje,² Mariam Al-Bayati,² Adir Baxi,² Alexa L Grudzinski,⁴ Laura Boland,⁵ Areti-Angeliki Veroniki,⁶ Dianna Wolfe,² Brian Hutton²

Relative Wirksamkeit von

Körperlichem Training
Ernährung
Kognitives Training
Psychosoziales Training

Einschluss

186 trials
15.684 participants
45% oncology, 23% orthopaedic, 11% major non-oncology, 11% cardiac or vascular, and 10% mixed

Outcome

Postoperative Komplikationen
Spitalsdauer
health related quality of life
Körperliche Erholung

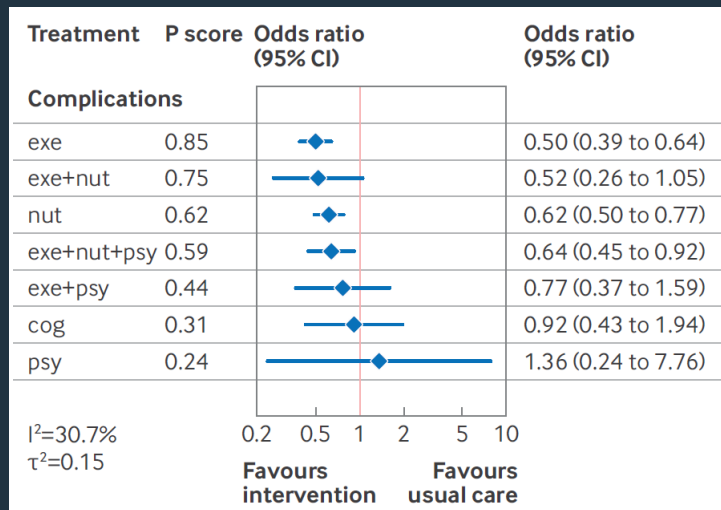
Vergleich

Prehab mind. 7 Tage vor OP begonnen
vs
Standard Care

Komplikationen

bis 30 Tage nach OP

exe = körperliches Training
nut = Ernährung
psy = psychosoziales / mentales Training
cog = kognitives Training

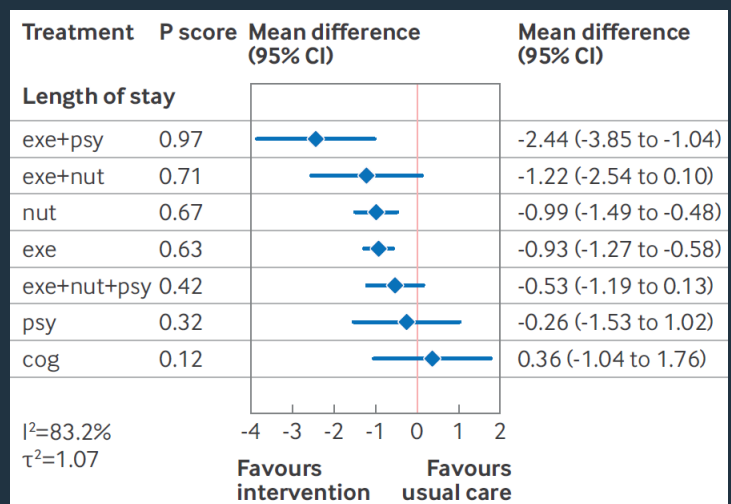


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Spitalsaufenthalt

Unterschied in Tagen

exe = körperliches Training
nut = Ernährung
psy = psychosoziales / mentales Training
cog = kognitives Training

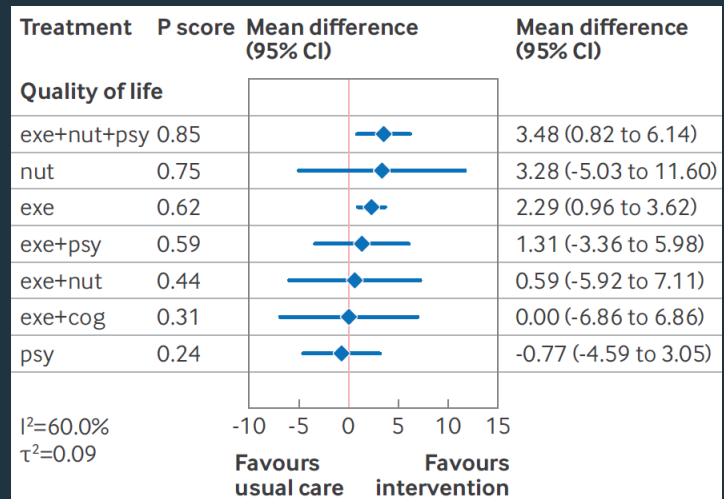


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Lebensqualität

LOQ

exe = körperliches Training
nut = Ernährung
psy = psychosoziales / mentales Training
cog = kognitives Training



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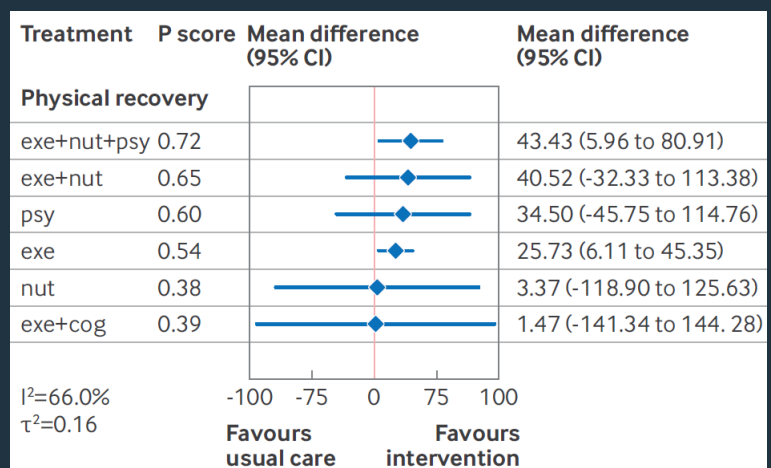
Präoperative Leistungsoptimierung



Körperliche Erholung

Körperliche Erholung
(6 Minuten Gehdistanz)

exe = körperliches Training
nut = Ernährung
psy = psychosoziales / mentales Training
cog = kognitives Training



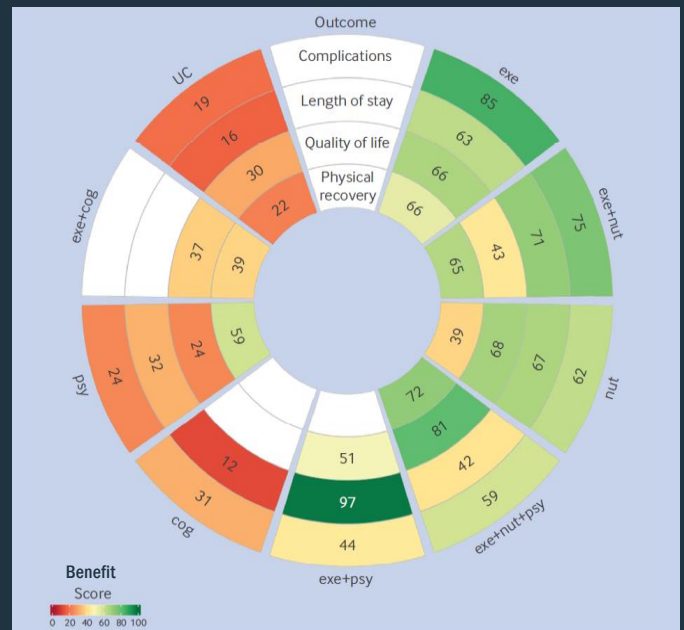
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Präoperative Leistungsoptimierung



Key Points

Exercise prehabilitation, Nutritional prehabilitation, and multicomponent interventions including exercise may benefit adults preparing for surgery and could be considered in clinical care.



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Präoperative Leistungsoptimierung



Key Points

Gewissheit der Ergebnisse niedrig

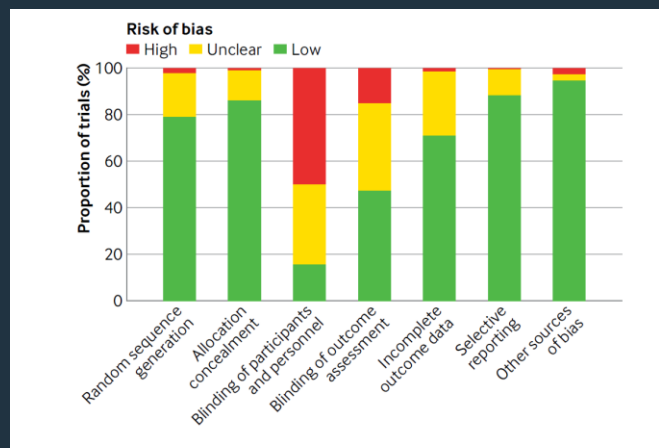


Fig 1 | Proportion of included studies with high, unclear, and low risk of bias for each bias domain of the Cochrane collaboration's risk of bias 1 tool

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Präoperative Leistungsoptimierung



Wie und Wo?

NEJM Journal Watch

GENERAL MEDICINE SPECIALTIES TOPICS VOICES CME GUIDELINE WATCH

SUMMARY AND COMMENT | GENERAL MEDICINE, AMBULATORY MEDICINE, HOSPITAL MEDICINE

INFORMING PRACTICE

February 11, 2025

Does “Prehabilitation” Improve Surgical Outcomes?

Bruce Soloway, MD, reviewing McIsaac DJ et al. *BMJ* 2025;Jan 22

A meta-analysis suggests that it does, although evidence to support specific presurgical interventions is weak.

Primary care clinicians might have noticed that some surgeons refer their patients for “prehabilitation” — preparing patients for surgery through exercise, nutritional enhancement, psychological support, cognitive training, or a combination of these components. But in general, existing evidence is regarded as low in quality and does not clarify the relative values of different forms of prehabilitation.

Researchers performed a network meta-analysis and component network meta-analysis of 186 randomized trials in which any form of prehabilitation was compared with usual care in 15,000 patients who were preparing for major surgery. Analyses were performed to compare the effects of various single-component and multicomponent interventions on complications, length of stay, health-related quality of life, and functional recovery (e.g., 6-minute walk test at 90 days after surgery).







Certainty of evidence was low to very low for most analyses largely due to challenges in achieving blinding of participants. Isolated exercise was most likely to lower rates of surgical complications, and multicomponent interventions (including exercise) were most likely to improve other outcomes. Nutritional interventions also significantly improved all outcomes. Evidence about psychological and cognitive interventions was too sparse to draw meaningful conclusions.

COMMENT

This analysis supports “prehabilitation” interventions involving exercise and nutrition. However, available evidence offers little guidance as to just how these interventions should be designed and implemented.

Home-based prehabilitation: a systematic review and meta-analysis of randomised trials

British Journal of Anaesthesia, 134 (4): 1018–1028 (2025)

Filippo D’Amico¹, Sara Dormio¹, Giulia Veronesi^{2,3}, Fabio Guarracino⁴ , Katia Donadello⁵ , Gilda Cinnella⁶, Riccardo Rosati^{3,7}, Nicolò Pecorelli^{3,8}, Gabriele Baldini^{9,10,11} , Marina Pieri^{1,3,*} , Giovanni Landoni^{1,3} , Stefano Turi¹ , and PREHAB study group

Adherence and Clinical Effectiveness von

Home-based Prehabilitation
Körperlichem Training
Ernährung
Kognitives Training
Psychosoziales Training

Einschluss

29 trials
3.508 participants
14 abdominal, 5 mixed non cardiac, 5 orthopaedic, 3 thoracic, 1 cardiac, 1 spinal

Outcome

Risk Ratio für postoperative Komplikationen
Adhärenz
6 Minuten Geh-Test
Spitalsdauer
preoperative hospital anxiety and depression score (HADS).

Vergleich

Home-based Prehab mind. 7 Tage vor OP begonnen
vs
Standard Care

Ergebnisse

Weniger postoperative Komplikationen in der Prehabilitationsgruppe:

38,4 % (508 von 1.322) vs 43,3 % (578 von 1.335)
 Relatives Risiko (RR): 0,84, $p = 0,02$
 Relative Risikoreduktion: 11,2 %
 Number Needed to Treat (NNT): 21
 Evidenzsicherheit: Niedrige Heterogenität (I^2): 44%

Sensitivitätsanalysen bestätigen den Effekt, insbesondere bei:

Multimodaler Prehabilitation: 27,8 % vs 40,4 %, RR: 0,70, $p < 0,01$
 Programmdauer > 2 Wochen: 28,1 % vs 35,1 %, RR: 0,80, $p < 0,01$
 Hochrisiko-Operationen: 56,0 % vs 62,4 %, RR: 0,77, $p = 0,03$

Sekundäre Outcome

Leistungsfähigkeit (6-Minuten-Gehtest):

Zu Beginn: Kein Unterschied zwischen Gruppen
 Nach Prehab: +28,2 m ($p < 0,001$, $I^2 = 48$ %)

Psychische Gesundheit (HADS-Skala):

Weniger präoperative Depression: MD: -0,65 ($p < 0,001$, $I^2 = 0$ %)
 Weniger Angst 2 Monate postoperativ: MD: -0,50 ($p < 0,001$, $I^2 = 0$ %)
 Kürzere Aufenthaltsdauer in der Prehab-Gruppe (MD: -0,3 Tage; $p = 0,03$, $I^2 = 45$ %)

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Präoperative Leistungsoptimierung



Wann? und Wie? Gestalt von Home-based Prehab

Dauer:

Median 4 Wochen (IQR: 2–4 Wochen)

Häufigkeit:

3–7 Trainingstage pro Woche

Dauer der Einheiten:

30–60 Minuten pro Sitzung

Trainingsarten:

Aerobes Training (am häufigsten, in 15 Studien)
 Atemmuskeltraining (in 3 Studien, als Teil des aeroben Trainings)
 Krafttraining (in 7 Studien)
 Therabänder verwendet (in 6 Studien)

Trainingsintensität:

Zielvorgaben nach Borg-Skala und Herzfrequenz (in 3 Studien)

Trainingsgeräte:

Atemtrainingsgeräte
 Stepper
 Fahrradergometer

Ernährungsintervention:

Multimodal (in 11 Studien)
 Nur Ernährung (unimodal) (in 2 Studien)
 Nahrungsergänzungsmittel (alle Studien, teilweise vollständige Mahlzeiten)

Psychologische & kognitive Unterstützung:

In 11 Studien enthalten
 CDs oder Mobile Apps in einigen Studien

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Präoperative Leistungsoptimierung



Start Your 7-Day Free Trial [BEGIN TODAY](#)

[P]REHAB

2:09

[P]

Hundreds of programs and workouts

- ✓ Relieve pain
- ✓ Prevent injury
- ✓ Improve Performance
- ✓ Optimize movement

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By clicking Join [P]rehab, you are agreeing to the

DON'T MISS THIS SPECIAL OFFER!

Get a ~~FREE 7-day~~ **14 day** trial of the Prehab app!

Email Address

[BEGIN TODAY!](#)

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Are you tired of...

Digitale Vorbereitung für geplante Operationen

Für bestmögliche Effektivität sollte PrehabM über einen Zeitraum von 3-6 Wochen vor dem Eingriff genutzt werden.

[Mehr erfahren](#)

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The image shows a smartphone screen with the PrehabM app. The app's main screen displays 'prehab m' and 'Checke deinen Trainingsplan'. A 'Dein Trainingsplan' overlay is shown, featuring a 30-minute 'Ausdauer' (Endurance) session and a 1-minute 'Balance' session. Below these, there's a section for 'Übung - Fersen-Zehen Gang' (Heel-to-toe walk). The bottom navigation bar includes icons for 'START', 'TAGEBUCH' (Journal), 'FAVS', 'ARCHIV' (Archive), and 'PROFIL' (Profile).

Your Path to a Successful Surgery Starts Here

Improve your surgery outcomes with prehabilitation program. Track your progress and share it with your doctor.

[Download for iOS](#)
[Download for Android](#)


How should patients at high risk of postoperative complications (respiratory, cardiac) be prehabilitated (physical therapy, nutrition)?
The role of prehabilitation should be established in noncardiac surgery patients.
Nutritional support before surgery should be considered in noncardiac surgery patients.

EJA
Eur J Anaesthesiol 2025; 42:1–35

GUIDELINES

Preoperative assessment of adults undergoing elective noncardiac surgery

Updated guidelines from the European Society of Anaesthesiology and Intensive Care

Emerging evidence suggests that prehabilitation (ie, physical conditioning, nutritional support, or both) before NCS may be associated with improved outcomes in selected patients with frailty. In selected patients, prehabilitation before NCS may be associated with improved outcomes.

2024 AHA/ACC/ACS/ASNC/HRS/SCA/SCCT/SCMR/SVM Guideline for Perioperative Cardiovascular Management for Noncardiac Surgery: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

Developed in Collaboration With and Endorsed by the American College of Surgeons, American Society of Nuclear Cardiology, Heart Rhythm Society, Society of Cardiovascular Anesthesiologists, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and the Society for Vascular Medicine

EJA

Eur J Anaesthesiol 2025; **42**:419–429

REVIEW ARTICLE

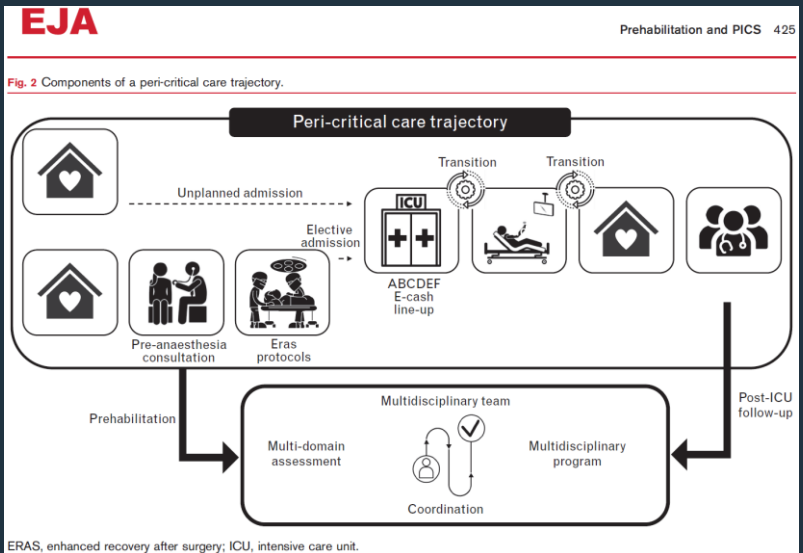
Prehabilitation to mitigate postintensive care syndrome in surgical patients

The rationale for a peri-critical illness pathway involving anaesthesiologists and intensive care physicians

Anne-Françoise Rousseau, Gabriel Thierry, Bernard Lambermont, Vincent Bonhomme and Joana Berger-Estilita

Prehab & PICS

Patient Journey



Patienten/innen erfahren vielfältige positive Effekte.
Dazu gehören ganz besonders die folgenden Effekte:

Eine schnellere Rückkehr in den Alltag

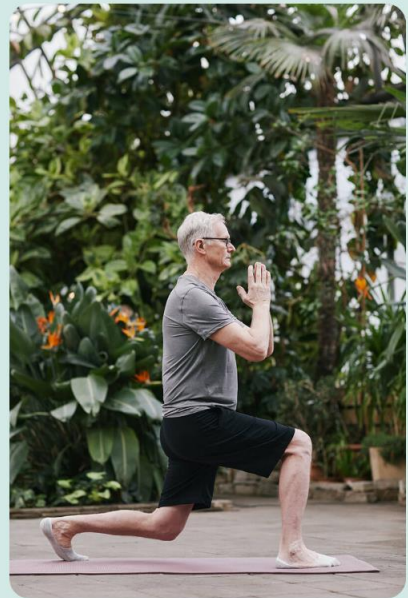
Vermeidung von Komplikationen

Förderung der Gesundheit

Eine Verbesserung der Leistungsfähigkeit¹³, und Bewältigung etwaiger krankheitsbedingter Schwierigkeiten im Alltag

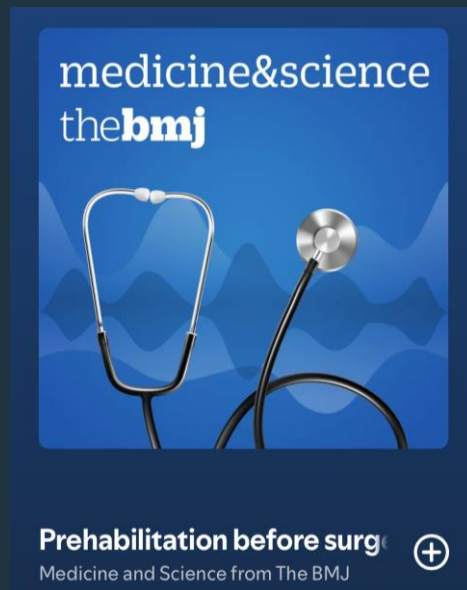
Eine verbesserte und aktive Patienten/inneneinbindung in den Heilungsprozess und damit höhere Patientensouveränität

Geringerer Zeitbedarf zur Vorbereitung



Was nun?

3x 1h Bewegung /Woche
1g Protein / kg / Tag



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Präoperative Leistungsoptimierung



Was nun?

3x 1h Bewegung /Woche
1g Protein / kg / Tag



Mach mit in der ARGE präoperatives und tagesklinisches Patientenmanagement:
praeop@oegari.at

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Präoperative Leistungsoptimierung



Diskussion

Was ist die Dosis?

Was ist usual care?

Adhärenz und Akzeptanz?

Sozioökonomischer Status?

Geographische Unterschiede?

Auswirkung auf Intensive Care Outcomes and PICS?

Mikrobiom?

Delir? Demenz? POCD?

Shortcut GLP1-Agonists?

EJA

Prehabilitation and PICS 423

Fig. 1 Components of a prehabilitation program and their interactions.

