Better In = Better out?

A literature study and case report

Thomas Hoogeboom
What am I talking about:

- Rationale for preoperative exercise
- What does the literature tell us?
- How do we practice the evidence?
Preoperative functioning is related to postoperative functioning.

Improve preoperative functioning

Improve postoperative functioning
Musculoskeletal fitness

Disability

Surgery

Time →

Warburton, 2009; van de Sluis, 2010
This makes no sense?!
50% of the people awaiting surgery deteriorates.
Musculoskeletal fitness

Surgery

Disability

Time →

Warburton, 2009; van de Sluis, 2010
Preoperative functional status

Hospitalization and/or major surgery

Physical activity level ↓ → Deconditioning ↑ → Functional decline ↑

Surgical stress ↑

Postoperative complications ↑

Length of stay ↑ → Mortality ↑ → Activities of daily living ↓
Young + Fit
Old
Old + Frail

Musculoskeletal fitness
Disability

Surgery
Time

Warburton, 2009; van de Sluis, 2010
Musculoskeletal fitness

Old + Frail

Disability

Surgery

Time →

Warburton, 2009; van de Sluis, 2010
Merits of preoperative exercise in:

- Cardiovascular surgery
- Upper and lower abdominal surgery
- Total hip and knee replacement
“[…] preoperative physical therapy reduces postoperative pulmonary complications and length of hospital stay in patients under going elective cardiac surgery.”
Prediction of postoperative pulmonary complications on the basis of preoperative risk factors in patients who had undergone coronary artery bypass graft surgery.

Hulzebos EH¹, Van Meelere NL, De Bie RA, Dagnelie PC, Helders PJ.

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score (Points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of ≥70 y</td>
<td>3</td>
</tr>
<tr>
<td>Productive cough</td>
<td>3</td>
</tr>
<tr>
<td>Smoking</td>
<td>2</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protective Factor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted IVC of ≥75%</td>
<td>−2</td>
</tr>
<tr>
<td>Predicted MEP of ≥75%</td>
<td>−2</td>
</tr>
</tbody>
</table>

−4 to −2 pts = low risk
−1 to 10 pts = high risk.
“Preoperative […] training significantly improves respiratory (muscle) function in the early postoperative period, halving the risk of pulmonary complications.”
The association of pre-operative physical fitness and physical activity with outcome after scheduled major abdominal surgery

J. J. Dronkers,¹ A. M. J. Chorus,² N. L. U. van Meeteren³* and M. Hopman-Rock⁴

Predictors for adverse outcomes:
• Low preoperative activity level
• Low inspiratory muscle endurance
“Preoperative therapeutic exercise for TJR did not demonstrate beneficial effects on postoperative functional recovery.”
Merits of exercise therapy before and after major surgery

Preop exercise in high-risk individuals:

- Length of stay ➣
- Postoperative functioning ➤
- Postoperative healthcare use ➣
So, how do we do this in practice?
Thanks!

Geert van der Sluis, PT MSc
Physiotherapist (1998)
Physiotherapy scientist (2007)
Goal of this case study

Let the patient revolution begin!
Evidence Based Practice
EBP: “Healthcare decisions should be made by those receiving care, informed by the best available knowledge of those providing care.”

– Sicily Statement 2005
Patient decides:

- when the surgery takes place;
- how to prepare for surgery;
- when to be discharged home;
- where to go after surgery.
Person undergoing hip replacement:

- **Name:** Jane Do
- **Age:** 78 year
- **Sex:** Woman
- **Length:** 1.56 m
- **Weight:** 104 kg
- **BMI:** 41.6 kg/m$^2$
- **TUG time:** 13.25 seconds
Medical diagnosis:

Knee osteoarthritis (right):
Kellgren & Lawrence grade 4
- Joint Space Narrowing
- Osteophytes
- ~Sclerosis
Preoperative screening

Anamnesis:
- Knee feels instable (doesn’t trust her knee)
- Stiffness >> Pain (VAS = 4)
- Patient Specific Complaints:
  - Walking (with a stroller),
  - Daily household chords (receives help)
  - Cycling (impossible)
- Lives on her own (appartement)
- She is a widow
Is Jane at risk for delayed functional recovery (>4 days)?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds ratio</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 70</td>
<td>4.2</td>
<td>1.7 - 13.0</td>
</tr>
<tr>
<td>Sex: Female</td>
<td>2.0</td>
<td>0.6 - 6.5</td>
</tr>
<tr>
<td>BMI &gt; 25 kg/m²</td>
<td>1.4</td>
<td>0.3 - 5.5</td>
</tr>
<tr>
<td>Timed Up and Go &gt; 10.5 sec</td>
<td>5.2</td>
<td>1.9 - 14.1</td>
</tr>
</tbody>
</table>

Yes, Jane has an increased risk

Area under ROC curve = 82%
How to prepare for surgery?
What did Jane decide?

- Planned date: 27 January 2014
- Decision Jane: Postpone surgery for 4 weeks to get in better shape.
- Actual date: 25 February 2014
Optimal preparation:

- Preoperative therapeutic exercise
- At least 3 weeks
- Complex, variation and intensive
- Aimed to improve relevant activities
- Supervised: Two days / week
- Unsupervised: Everyday
- Location: At the patient’s home

Swank, 2011; Hansen, 2012; Oosting, 2013
Content of exercise programme

• Circuit training
• Walking exercise (changing context)
• Transfers
• Climbing stairs
• Coach and provide information
Evaluation

Pre- and postoperative:

• Timed Up and Go test
• DEMMI
<table>
<thead>
<tr>
<th>Bed</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bridge</td>
<td>unable</td>
<td>able</td>
<td></td>
</tr>
<tr>
<td>2. Roll onto side</td>
<td>unable</td>
<td>able</td>
<td></td>
</tr>
<tr>
<td>3. Lying to sitting</td>
<td>unable</td>
<td>min assist</td>
<td>supervision</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chair</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Sit unsupported in chair</td>
<td>unable</td>
<td>10 sec</td>
<td></td>
</tr>
<tr>
<td>5. Sit to stand from chair</td>
<td>unable</td>
<td>min assist</td>
<td>supervision</td>
</tr>
<tr>
<td>6. Sit to stand without using arms</td>
<td>unable</td>
<td>able</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Static balance (no gait aid)</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Stand unsupported</td>
<td>unable</td>
<td>10 sec</td>
<td></td>
</tr>
<tr>
<td>8. Stand feet together</td>
<td>unable</td>
<td>10 sec</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dynamic balance (no gait aid)</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Pick up pen from floor</td>
<td>unable</td>
<td>able</td>
<td></td>
</tr>
<tr>
<td>14. Walks 4 steps backwards</td>
<td>unable</td>
<td>able</td>
<td></td>
</tr>
<tr>
<td>15. Jump</td>
<td>unable</td>
<td>able</td>
<td></td>
</tr>
</tbody>
</table>
Evaluation

Pre- and postoperative:
• Timed Up and Go test
• DEMMI

Clinical phase:
• Iowa Level of Assistance Scale (ILAS)
Iowa Levels of Assistance Scale (ILAS)

- Assistance score 0-6
  - Lying down to sitting
  - Sitting to lying down
  - Sit to stand
  - Walking (5 meters)
  - Climbing stairs (3 steps)

- Functional recovery if score = 0
  6: not tested
  5: impossible
  4: much assistance
  3: moderate assistance
  2: little assistance
  1: supervision
  0: independently

Gucionne 1996
Findings
TUG over time

Without a stroller
DEMMI over time
# Outcomes during the clinical phase

<table>
<thead>
<tr>
<th></th>
<th>Day 0</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supine - Sit</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit - Supine</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit - Stand</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 meter walk</td>
<td>5</td>
<td>-</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 stair flights</td>
<td>6</td>
<td>-</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>10</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Decision by the patient: When am I going home?

“The nurses want to discharge me on Friday (5 days after surgery), however I feel like I could go home tomorrow.”

The physical therapist agreed and so it happened..
# Outcomes in the clinical phase

<table>
<thead>
<tr>
<th></th>
<th>Dag 0</th>
<th>Dag 1</th>
<th>Dag 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lig - Zit</td>
<td>3</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Zit - Lig</td>
<td>3</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Zit - Staan</td>
<td>3</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>5 meter lopen</td>
<td>5</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>3 traptreden</td>
<td>6</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Totaal</td>
<td>20</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>
At home (1 week later)

- “I feel really good”
- She visited her grandson’s birthday (participation 5 days after OK)
- VAS pain = 2 (on average)
- Swelling lower extremity ↑
- “I can already cook by myself”
- “I feel as if walking reduces the stiffness in my knee”
“I actually was a really lazy woman”
Thank you for your attention. Are there any questions?