Complex & High-Cost Exercise Equipment for SCI Notes

Applying evidence and practical tools to guide clinical decisions on high-cost exercise equipment for people with spinal cord injury (SCI).

Why This Topic & Objectives

- Last survey showed broad interest in exercise equipment.
- Scope narrowed to upper/lower-limb ergometers and Functional Electrical Stimulation (FES) cycling, as these are most often prescribed for SCI.
- **Objectives**
    - Build confidence in prescribing complex equipment.
    - Share current literature that supports equipment prescription.
    - Provide tools to justify recommendations.
    - Introduce a comparison chart to aid selection.
    - Align practice with national SCI guidelines and research findings.

Core Resources Reviewed

- **SCI Physiotherapy Guidelines:** Expert advice across the SCI care continuum.
- **ACC 2012 FES Rapid Review:** Review of FES cycling for strength, cardio health, and wellbeing.
- These two documents set the baseline for today's deeper dive.

Literature Search – Methods & Patterns

- Studies dated **2020 onward** searched in Google Scholar, PubMed, and PEDro.
- Keywords: SCI, exercise, FES, arm/leg trainer, ergometry.
- Acute SCI studies excluded.
- **Patterns identified**
    - Participants mostly adults (>18 yrs) and Caucasian.
    - Limitations included small number of participants (<25), only partial blinding, self-reported activity and short follow-up.
    - COVID-19 interruptions noted.
    - Optimal exercise dosing, cost-effectiveness, and delivery models remain unclear.

Evidence for FES Leg Cycling

- **Rosley et al.:** Found adding FES resisted leg training to FES cycling improved muscle torque and volume in people with incomplete SCI.
- **Farkas et al.:** Arm Crank outperformed FES cycling in cardio gains; authors suggest voluntary muscle use may drive the difference.
- **Systematic review:** Highest confidence for FES cycling's effect on muscle mass and fatigue resistance; aimed to inform an international guideline.

FES studies and their link to SCI Guidelines and FES Review.

- Rosley et al. backs pairing electrical stimulation with strength training – consistent with SCI guidelines.
- Systematic review reinforces FES cycling's role in countering atrophy.
- Van der Scheer and Farkas both support FES cycling for cardiovascular fitness, echoing ACC Rapid Review conclusions.

Evidence for Arm Crank Exercise (ACE)

- **Systematic review:** Improved cardio fitness; insufficient evidence for other outcomes; no shoulder injury reported.

- **Adapted rowing vs ACE (single 5-min bouts):** Rowing showed higher exertion and oxygen use – may balance posterior shoulder and trunk muscles.
- **Farkas study:** ACE group achieved greater gains than FES cycling.
- Collectively, these studies strengthen the guideline recommendation that ACE can improve fitness in SCI.

Home Exercise – Practical Factors

- Qualitative comparison of home vs gym programs highlights the need to consider:
    - Local facility access and equipment availability.
    - Motivating environments and social interaction preferences.
    - Independence with set-up and space at home.
    - Cost and personal preference – key to person-centred plans.

Home Exercise – Remote Delivery

- **Workout on Wheels Internet (WOWii):** included virtual group sessions, smartwatch monitoring, wellness modules; and gained 75 % completion rate.
- Additional studies explore individual vs group programs, upper-body rowing, and high-intensity tele-coached ACE – all signal promise for remote formats.

What the Evidence Means in Practice

1. Arm Crank consistently boosts aerobic capacity; evidence trend is positive, but larger trials are needed.
2. Home-based programs are feasible and engaging when tech and peer support are built-in.
3. FES cycling maintains muscle mass; adding resistance training may amplify benefits, especially in incomplete SCI.
4. FES bikes improve cardiovascular health by offsetting inactivity in paralysis.

Clinical Reasoning & Support Tools

- Justification must link equipment choice to client goals, abilities, and environment.
- Templates, examples, and comparison charts available on the Enable NZ website to structure reasoning and strengthen ACC reports.
- Feedback on the new comparison chart is encouraged.

Slide 12: Case Example – Incomplete C3 SCI Cyclist

- **Profile:** Power-wheelchair user, former competitive cyclist, aims to hand cycle 3×/wk, build strength, and improve cardio.
- **Barrier:** No suitable equipment.
- **Process:**
    - Filter comparison chart for arm and leg ergometers, sorted by cost.
    - Identify equipment features and benefits.
    - Ensure equipment adapts to limited hand function and trains both limbs.
    - Confirm specs with suppliers and document how often your client will use equipment in reports.

Slide 13: Key Takeaways

1. Current evidence supports FES, Arm Crank, and home exercise for SCI.
2. Despite small, short-term studies, benefits in fitness, strength, and engagement recur.
3. Structured tools and charts bolster clinical reasoning and ACC justification.
4. Comparison charts streamline matching equipment to client needs.
5. Align recommendations with national SCI guidelines and best practice.

Need a second opinion before you hit “submit”?

Email our Clinical Services Advisors at acc.advisor@enable.co.nz .

Our clinical team is on hand to guide you through every step of the equipment-prescription process.

Reach out with questions or to explore options before you lodge orders in MRES—one quick conversation can save time and sharpen your ACC report.