



Bispebjerg
Hospital



FACULTY OF MEDICINE
AND HEALTH SCIENCES

Exercise prescription for shoulder rehabilitation: Translating Research into Clinical Practice



Ann Cools, PT, PhD
Ghent University, Belgium
Bispebjerg Hospital, University of Copenhagen,
Denmark

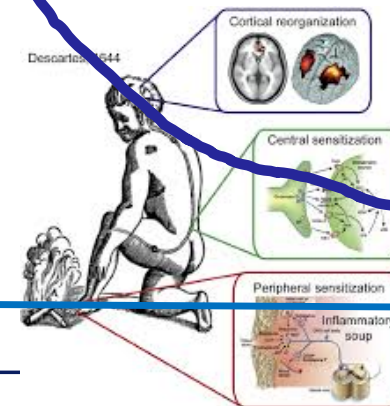
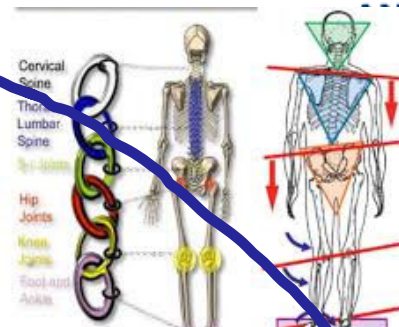


Ann Cools Odense March 2022

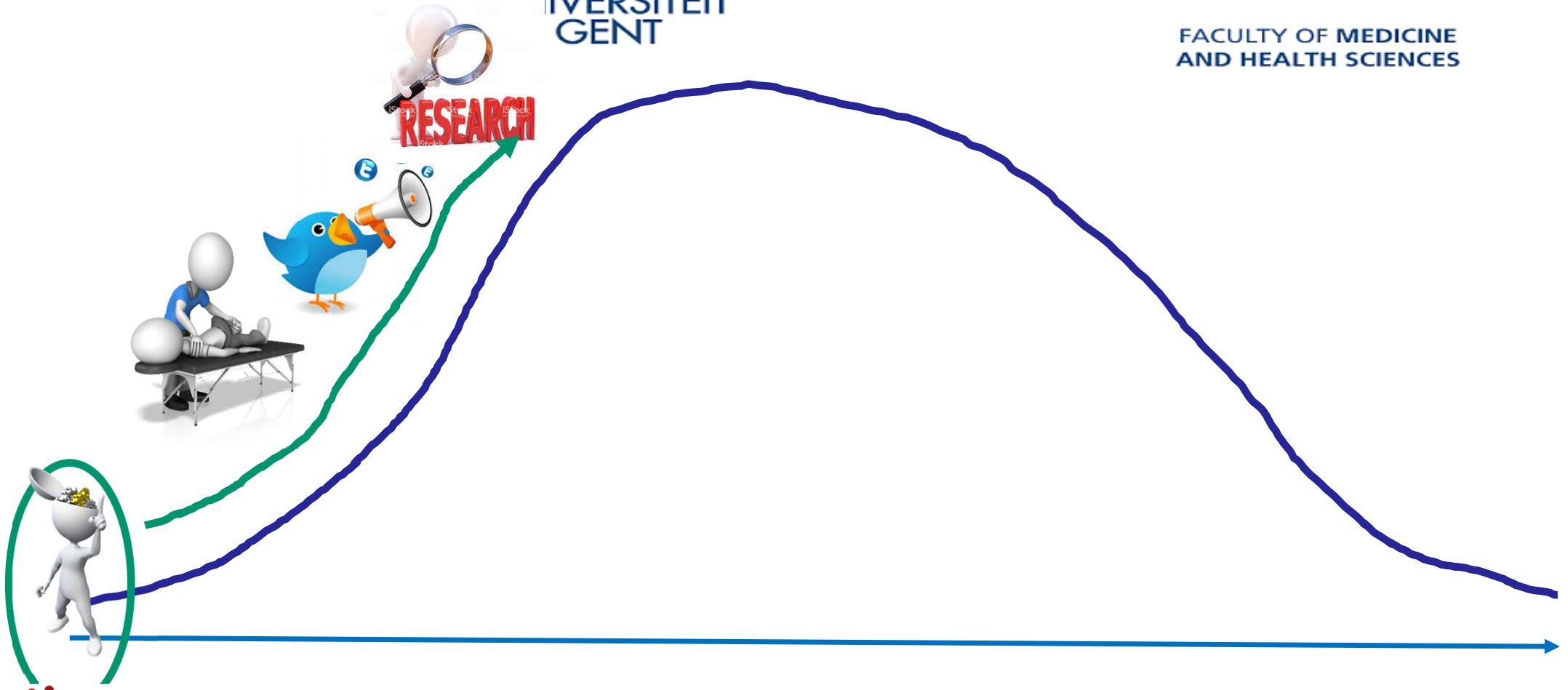


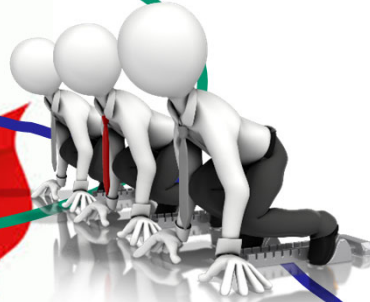
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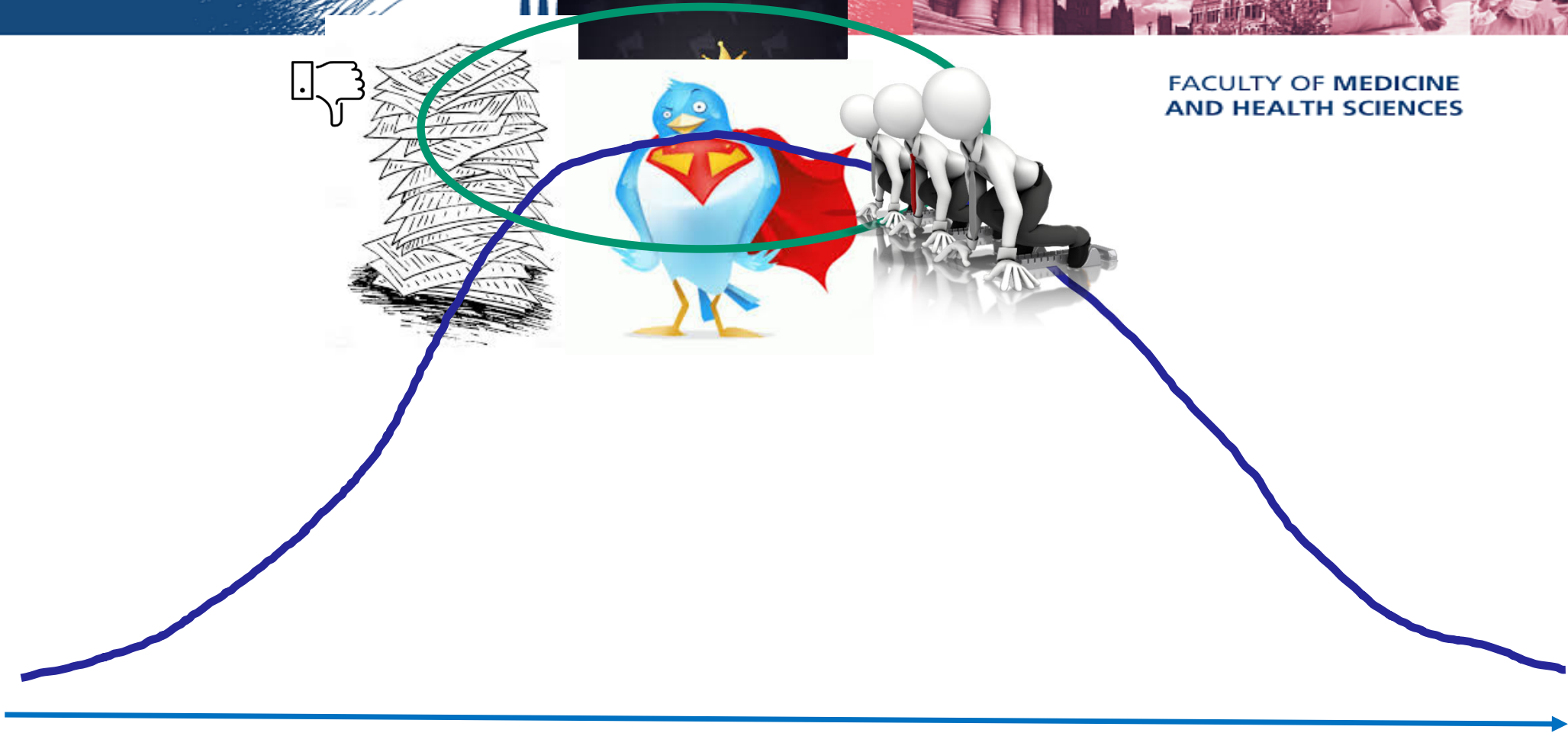


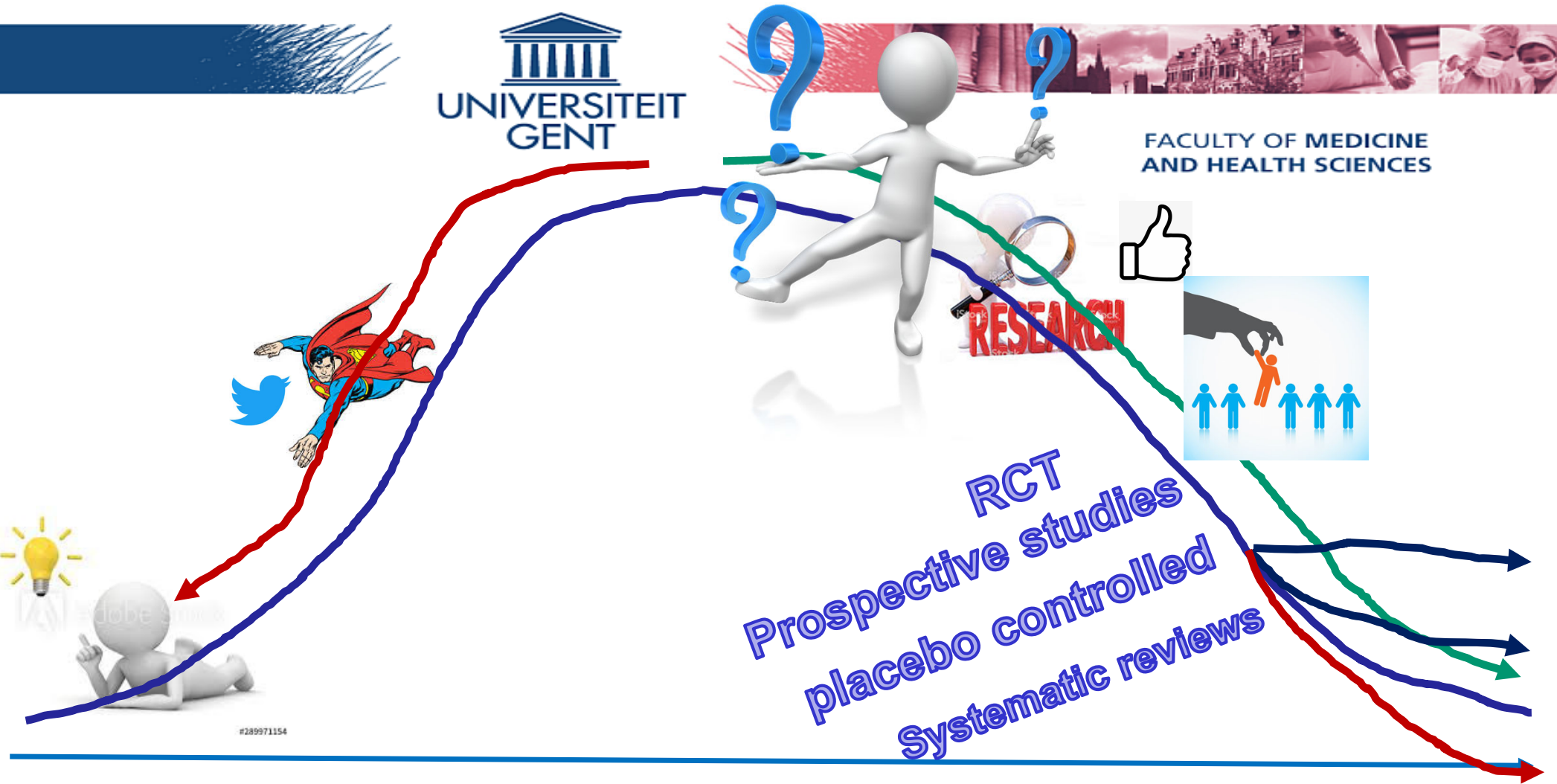
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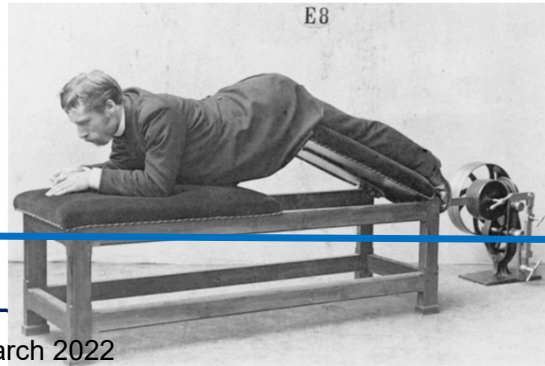


UPDATE



Exercise therapy

2000
years



Ann Cools Odense March 2022

Exercise Therapy: key element in the management of most shoulder disorders!

Comparison of 2 Exercise Rehabilitation Programs for Multidirectional Instability of the Glenohumeral Joint

A Randomized Controlled Trial

Sarah A. Warby,^{*†‡§} PhD, B Physio (Hons), Jon J. Ford,[†] PhD, M Physio, B A Andrew J. Hahne,[†] PhD, B Physio (Hons), Lyn Watson,^{†‡§} DProf., B AppSci (F Simon Balster,^{‡§} BPhy (Hons), BSc(Hons), Ross Lenssen,^{†‡§} BHSc, and Tania Pizzari,[†] PhD, B Physio (Hons)
Investigation performed at La Trobe University, Bundoora, Australia

J Occup Health 2016; 58: 389-403



Review

Efficacy of exercise therapy in workers with rotator cuff tendinopathy: a systematic review

François Desmeules^{1,2}, Jennifer Boudreault¹, Clermont E. Dionne^{3,5}, Pierre Frémont^{3,5}, Véronique Lowry¹, Joy C. MacDermid⁶ and Jean-Sébastien Roy^{3,4}

IJSPT SYSTEMATIC REVIEW EXERCISE THERAPY IN THE NON-OPERATIVE TREATMENT OF FULL-THICKNESS ROTATOR CUFF TEARS: A SYSTEMATIC REVIEW

Michael Jeanfavre, PT, DPT, CSCS¹
Sean Husted, PT, DPT, CSCS²
Gretchen Leff, PT, DPT, MSPT, OCS¹

Review

Effectiveness of physical therapy treatment of clearly defined subacromial pain: a systematic review of randomised controlled trials

M N Haik,¹ F Albuquerque-Sendin,^{2,3} R F C Moreira,⁴ E D Pires,¹ P R Camargo¹

Rehabilitation of scapular dyskinesia: from the office worker to the elite overhead athlete

Ann M J Cools,¹ Filip Struyf,² Kristof De Mey,¹ Annelies Maenhout,¹ Birgit Castelein,¹ Barbara Cagnie¹

Ann Cools Odense March 2022

How do we choose the exercises in EBP?




Guidelines?

MARTIN J. KELLEY, DPT • MICHAEL A. SHAFFER, MSPT • JOHN E. KUHN, MD • LORI A. MICHENER, PT, PhD
AMEE L. SEITZ, PT, PhD • TIMOTHY L. UHL, PT, PhD • JOSEPH J. GODGES, DPT, MA • PHILIP W. MCCLURE, PT, PhD

Shoulder Pain and Mobility Deficits: Adhesive Capsulitis

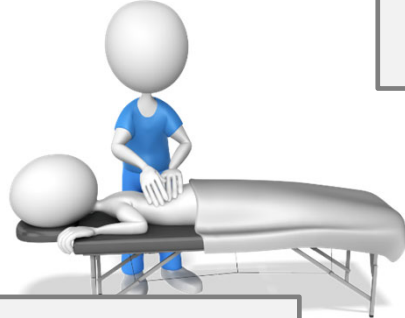
Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health From the Orthopaedic Section of the American Physical Therapy Association

J Orthop Sports Phys Ther 2013;43(5):A1-A31. doi:10.2519/jospt.2013.0302

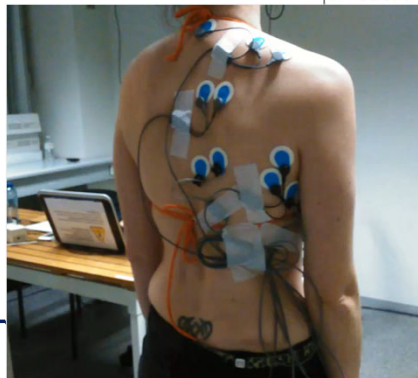


Is the program proven to be effective?

Assumed immediate effect of an exercise on biomechanics and muscle recruitment?



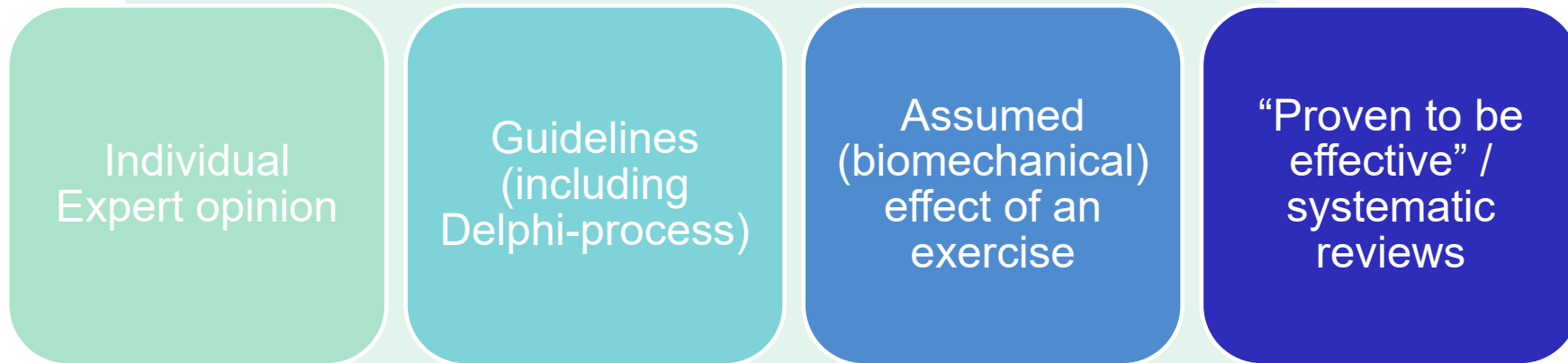
What does the expert say?



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Rehabilitation of Elbow
Injuries
Nonoperative and Operative

in E. Wilk, PT, DPT^{a,b,*}, Christopher A. Arrigo, MS, PT, ATC^{c,d}

Manual Therapy 23 (2016) 57–68

Contents lists available at ScienceDirect

Manual Therapy

journal homepage: www.elsevier.com/math

Masterclass

Rotator cuff related shoulder pain: Assessment, management and uncertainties

Jeremy Lewis^{*}

Department of Allied Health Professions and Midwifery, School of Health and Social Work, Wright Building, College Lane Campus, University of Hertfordshire, Hatfield AL10 9AB, Hertfordshire, UK

ELSEVIER

The Shoulder at Risk: Scapular Dyskinesia and Altered Glenohumeral Rotation[☆]

William Benjamin Kibler, MD, and Aaron Sciascia, MS, ATC, PES

Operative Techniques
Sports Medicine

Current Reviews in Musculoskeletal Medicine (2020) 13:155–163
<https://doi.org/10.1007/s12178-020-09615-1>

INJURIES IN OVERHEAD ATHLETES (J. DINES AND C. CAMP, SECTION EDITORS)

Step by Step Guide to Understanding the Kinetic Chain Concept in the Overhead Athlete

Todd S. Ellenbecker¹ · Ryoki Aoki²

Check for updates

ELSEVIER

Available online at
ScienceDirect
www.sciencedirect.com

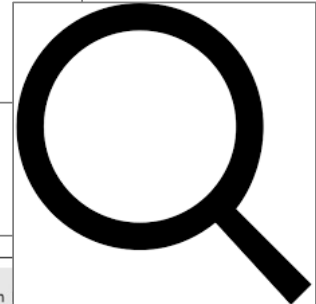
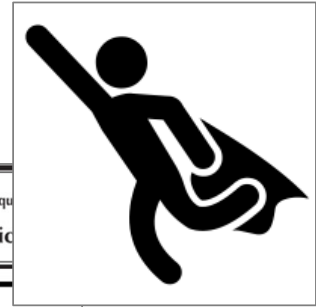
Elsevier Masson
EM|consulte
www.em-consulte.com

SOFMER

Review

The challenge of the sporting shoulder: From injury prevention through sport-specific rehabilitation toward return to play

Ann M. Cools^{a,b,*}, Annelies G. Maenhout^a, Fran Vanderstukken^a, Philippe Declève^{a,c}, Fredrik R. Johansson^d, Dorien Borms^a



Individual
Expert
opinion

Ann Cools Odense March 2022



Guidelines
(including
Delphi-
process)

[CLINICAL COMMENTARY]

BRYCE W. GAJUNT, PT, SCS¹ • MICHAEL A. SHAFFER, MSPT, OCS, ATC² • ERIC L. SAJJERS, PhD, ATC³
LORI A. MICHENER, PT, PhD, ATC, SCS⁴ • GEORGE M. MCCLUSKEY III, MD⁵ • CHUCK A. THIGPEN, PT, PhD, ATC⁶

The American Society of Shoulder and
Elbow Therapists' Consensus Rehabilitation
Guideline for Arthroscopic Anterior
Capsulolabral Repair of the Shoulder

[CONSENSUS STATEMENT]

ARIANE SCHWANK, PT, MSc^{1,2a} • PAUL BLAZEY, PT^{3a} • MARTIN ASKER, PT, PhD^{4,5} • MERETE MOLLER, PT, PhD
MARTIN HÄGGLUND, PT, PhD⁶ • SUZANNE GARD, PT, MSc^{2b1} • CHRISTOPHER SKAZALSKI, PT, DPT⁷
STIG HAUGSBO ANDERSSON, PT, PhD⁸ • IAN HORSLEY, PT, PhD² • ROD WHITELEY, PT, PhD^{3a} • ANN M. COOLS, F
MARIO BIZZINI, PT, PhD⁹ • CLARE L. ARDERN, PT, PhD¹⁰ • ON BEHALF OF THE ATHLETE SHOULDER CONSENSUS

2022 Bern Consensus Statement
on Shoulder Injury Prevention,
Rehabilitation, and Return to Sport for
Athletes at All Participation Levels

Physical Therapy in Sport 44 (2020) 92–98

Contents lists available at ScienceDirect



Physical Therapy in Sport

journal homepage: www.elsevier.com/ptsps



Original Research

Development of a short and effective shoulder external rotation
strength program in handball: A delphi study

Hilde Fredriksen ^{a,*}, Ann Cools ^b, Grethe Myklebust ^a

^a Oslo Sports Trauma Research Center, Norwegian School of Sport Sciences, Sports Medicine Department, Oslo, Norway
^b Rehabilitation Sciences and Physiotherapy, Ghent University, Ghent, Belgium



[RESEARCH REPORT]

JACKIE SADI, PT, MSc¹ • ERIK TORCHIA, PT, MCISc² • KENNETH J. FABER, MD, MHPE, FRCSC³
JOY MACDERMID, PT, PhD^{1,3} • CORINNE LALONDE, PT, MCISc⁴ • LYN WATSON, PT, DProf⁵
MARJORIE WEBER, PT, MCISc⁶ • NAN WU, PT, MCISc⁷

Posterior Shoulder Instability Classification,
Assessment, and Management:
An International Delphi Study

Ann Cools Odense March 2022

Individual
Expert opinion

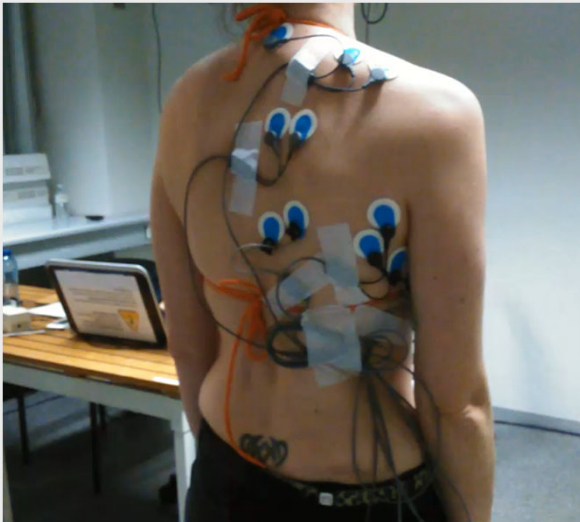
Guidelines
(including
Delphi-process)

Assumed
(biomechanical)
effect of an
exercise

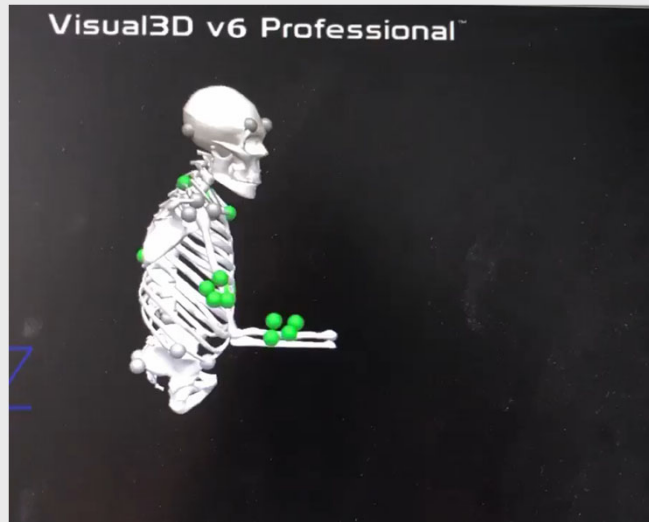
“Proven to be
effective” /
systematic
reviews

How can we measure immediate exercise effects in a biomechanical context?

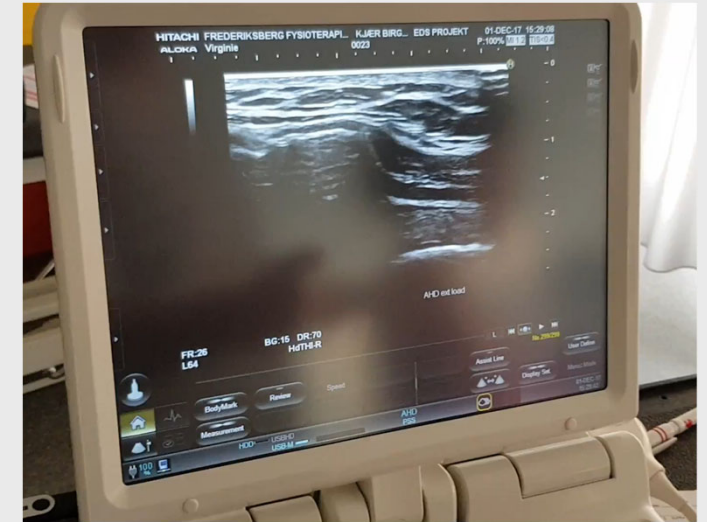
EMG (surface + fine wire)



3D-kinematics (scapula)



Quantitative US (AHD)



Translating research into the clinic....

PHYSI 11191-8 ARTICLE



ELSEVIER


Physiotherapy xxx (2020) xxx-xxx

The effect of five isometric exercises on glenohumeral translations in healthy subjects and patients with the hypermobility type of the Ehlers-Danlos syndrome (hEDS) or hypermobility spectrum disorder (HSD) with multidirectional shoulder instability

Valentien Spanhove^{a,*}, Inge De Wandele^{a,b}, Birgitte Hougs Kjær^c, Fransiska Malfait^d, Fran Vanderstulcken^d, Ann Cools^a

^a Department of Rehabilitation Sciences and Physiotherapy, Ghent University, Coupure links 10, 9000 Ghent, Belgium
^b Centre for Medical Genetics, Ghent University Hospital, Coupure links 10, 9000 Ghent, Belgium
^c Department of Physical and Occupational Therapy, Bispebjerg and Frederiksberg University Hospitals, 2400 Copenhagen, Denmark

J Shoulder Elbow Surg (2020) 29



ELSEVIER

ONLINE ARTICLES

Electromyographic analysis of selected shoulder muscles during a series of exercises commonly used in patients with symptomatic degenerative rotator cuff tears

Ann M. Cools, PT, PhD^{a,b,*}, Alexander Van Tongel, MD, PhD^c, Kelly Berckmans, PT, MSc^a, Valentien Spanhove, PT, MSc^a, Tibo Plaetevoet, PT, MSc^a, Jonas Rosseel, PT, MSc^a, Jasper Soen, PT, MSc^a, Ofer Levy, MD, MCh(Orth), FRCS^d, Annelies Maenhout, PT, PhD^a

^a Department of Rehabilitation Sciences and Physiotherapy, Ghent University, Coupure links 10, 9000 Ghent, Belgium
^b Centre for Medical Genetics, Ghent University Hospital, Coupure links 10, 9000 Ghent, Belgium
^c Department of Physical and Occupational Therapy, Bispebjerg and Frederiksberg University Hospitals, 2400 Copenhagen, Denmark
^d Department of Orthopaedic Surgery, University of Oxford, Oxford, United Kingdom



Analysis of Scapular Kinematics and Muscle Activity by Use of Fine-Wire Electrodes During Shoulder Exercises

Kelly Berckmans,[†] PT, Birgit Castelein,[†] PT, PhD, Dorien Borms,[†] PT, PhD, Tanneke Palmans,[†] Thierry Parlevliet,[†] MD, and Ann Cools,[†] PT, PhD
 Investigation performed at Ghent University, Ghent, Belgium



Bispebjerg Hospital



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Value of quantitative US for exercise selection? (Spanhove et al. Physiotherapy 2020)

PHYST 1119 1-8

ARTICLE IN PRESS

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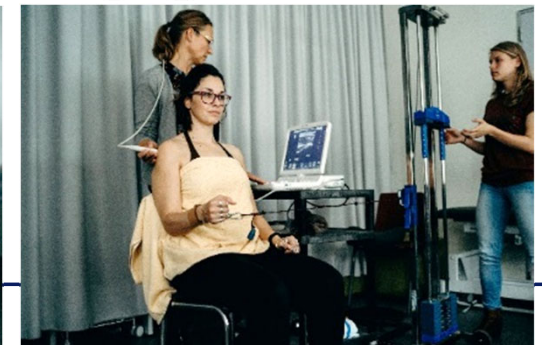
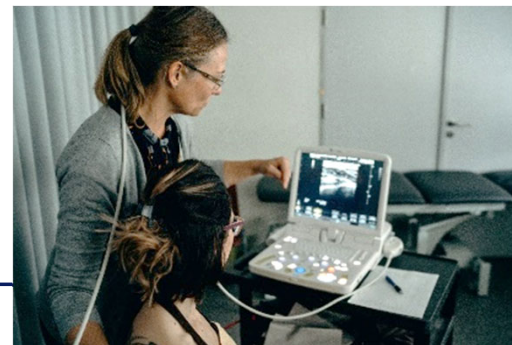
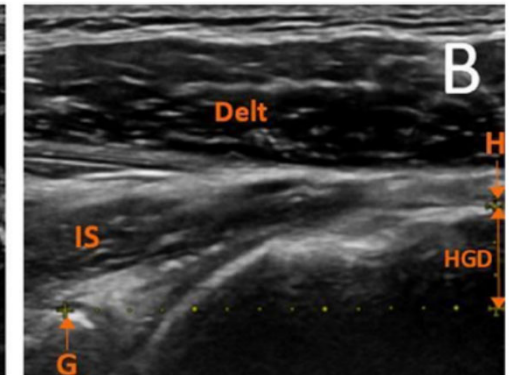
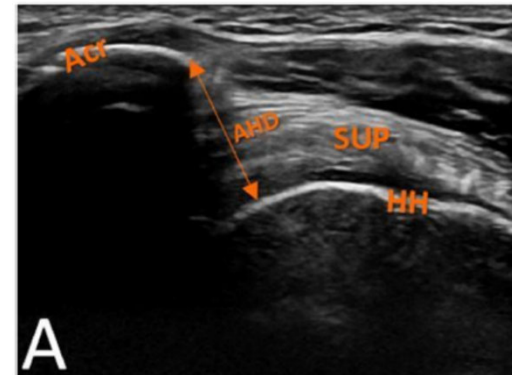
Physiotherapy

Physiotherapy xxx (2019) xxx-xxx

The effect of five isometric exercises on glenohumeral translations in healthy subjects and patients with the hypermobility type of the Ehlers-Danlos syndrome (hEDS) or hypermobility spectrum disorder (HSD) with multidirectional shoulder instability

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^b Centre for Medical Genetics, Ghent University Hospital, Corneel Heymanslaan 10, 9000 Ghent, Belgium
^c Department of Physical and Occupational Therapy, Bispebjerg and Frederiksberg University Hospitals, 2400 Copenhagen, Denmark



Ann Cools Odense March 2022

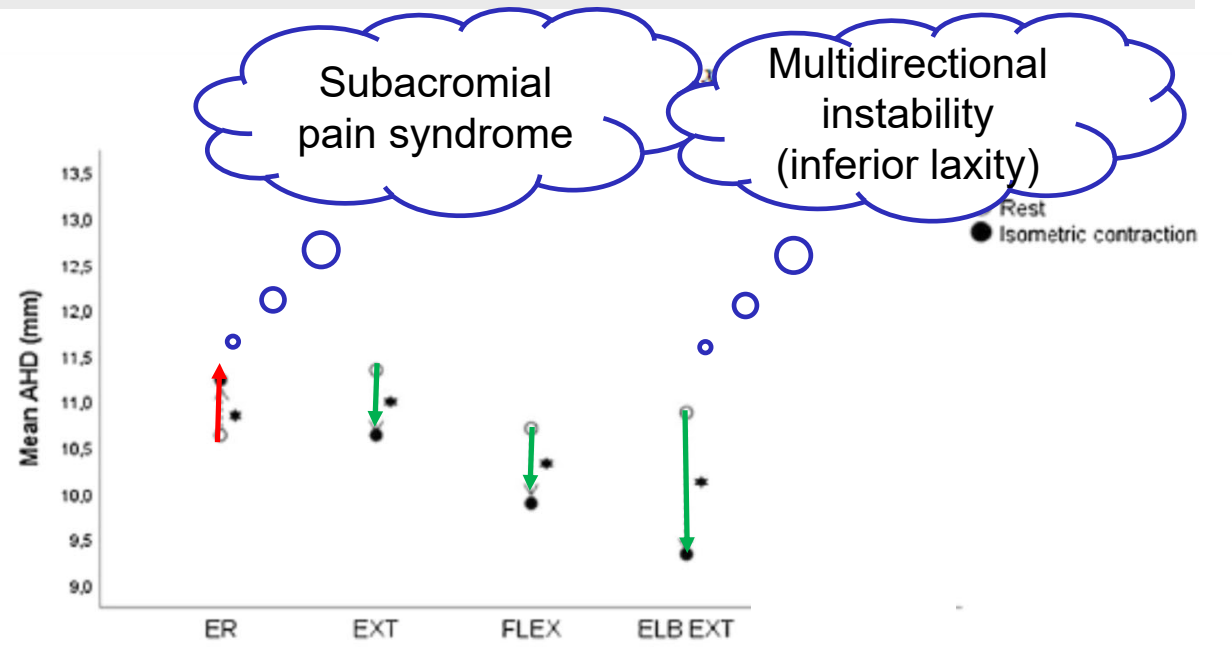


Value of quantitative US for exercise selection?

(Spanhove et al. Physiotherapy 2020)



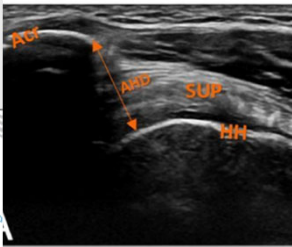
Ann Cools Odense March 2022



Translating research into the clinic....

PHYSIOTHERAPY xxx (2020) 1-8

ARTICLE



ELSEVIER

Physiotherapy xxx (2020) 1-8

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J Shoulder Elbow Surg (2020) 29



ELSEVIER

ONLINE ARTICLES

Electromyographic analysis of selected shoulder muscles during a series of exercises commonly used in patients with symptomatic degenerative rotator cuff tears

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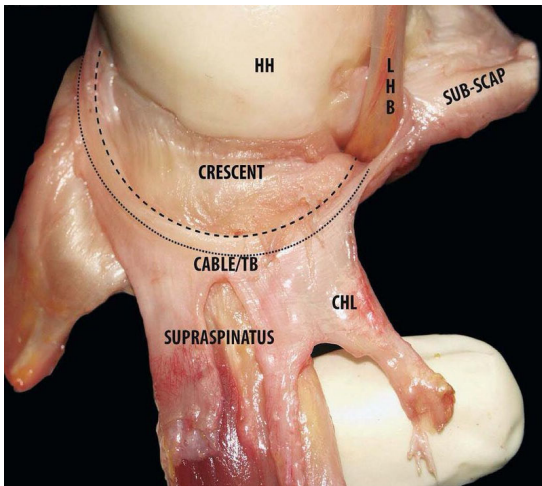


Analysis of Scapular Kinematics and Muscle Activity by Use of Fine-Wire Electrodes During Shoulder Exercises

Kelly Berckmans,^{*,†} PT, Birgit Castelein,[†] PT, PhD, Dorien Borms,[†] PT, PhD, Tanneke Palmans,[†] Thierry Parlevliet,[‡] MD, and Ann Cools,[†] PT, PhD
 Investigation performed at Ghent University, Ghent, Belgium

Ann Cools Odense March 2022

Degenerative rotator cuff tears: train the function, not the structure!



Bench slides



Wall slides



Levy Program



Do we train the deltoid
Without too much load
On the rotator cuff?



Edwards et al. "low load RC" exercises
JOSPT 2017



Levy et al. "anterior deltoid"
exercises JSES 2008

Ann Cools Odense March 2022



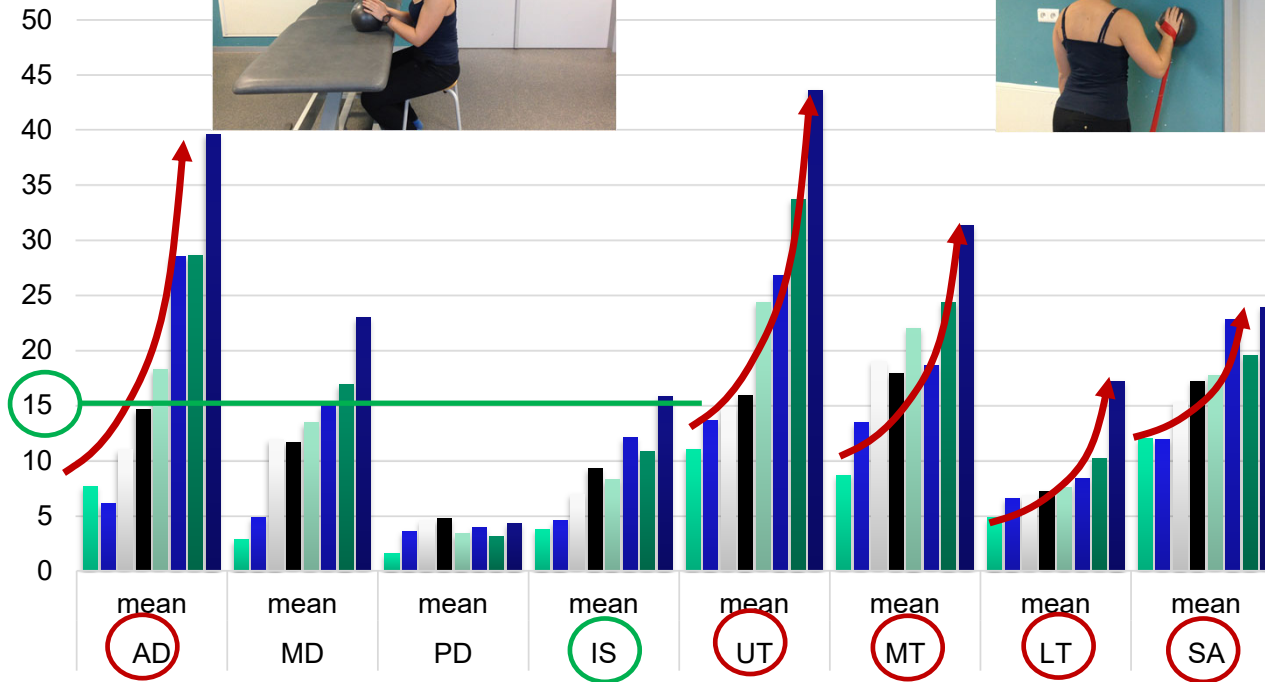
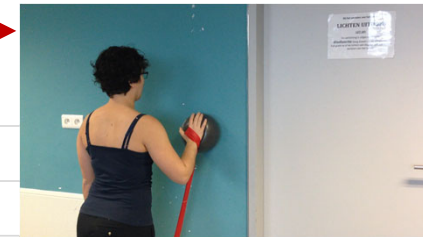
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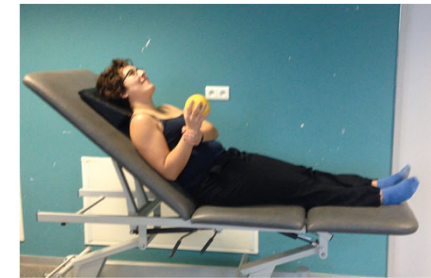
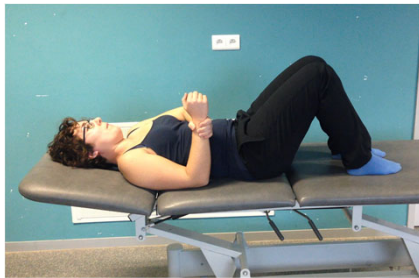


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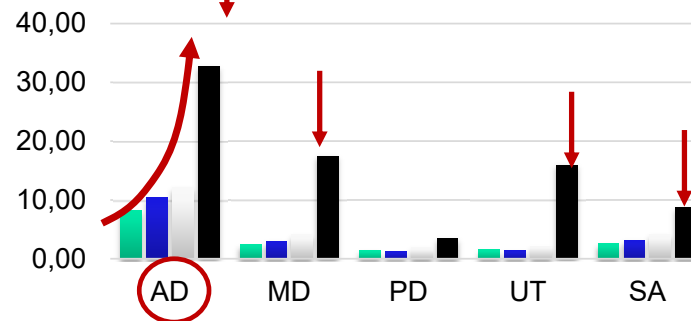
Ann M. Cools, PT, PhD^{a,b,c}, Alexander Van Tongel, MD, PhD^c, Kelly Berckmans, PT, MSc^a, Valentien Spanhove, PT, MSc^a, Tibo Plaetevoet, PT, MSc^a, Jonas Rosseel, PT, MSc^a, Jasper Soen, PT, MSc^a, Ofer Levy, MD, MCh (Orth), FRCS^d, Annelies Maenhout, PT, PhD^a



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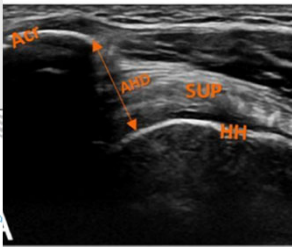


Levy-exercises



Translating research into the clinic....

PHYS 11191-8 ARTICLE



ELSEVIER
Physiotherapy xxx (2020) xxx-xxx

The effect of five isometric exercises on glenohumeral translations in healthy subjects and patients with the hypermobility type of the Ehlers-Danlos syndrome (hEDS) or hypermobility spectrum disorder (HSD) with multidirectional shoulder instability

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J Shoulder Elbow Surg (2020) 29



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ONLINE ARTICLES

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Investigation performed at Ghent University, Ghent, Belgium

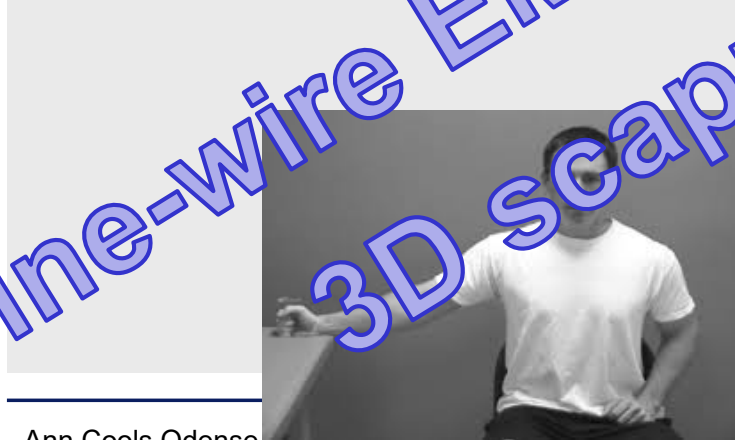
EMG-analysis of scapular muscles during rehabilitation exercises

Kibler et al. AJSM 2008; Berckmans Kelly et al. AJSM 2020

Electromyographic Analysis of Specific Exercises for Scapular Control in Early Phases of Shoulder Rehabilitation

W. Ben Kibler,^{*} MD, Aaron D. Sciascia,[†] MS, ATC, Timothy L. Uhl,[‡] Ph.D., PT, M.S., Nishin Tambay,[§] MD, and Thomas Cunningham,[‡] MS
 From the ^{*}Lexington Clinic Sports Medicine Center, Lexington, Kentucky, the [†]Division of Athletic Training, University of Kentucky, Lexington, Kentucky, and [§]Orthopaedic Associates of West Florida, Tampa, Florida

Fine-wire EMG on deep muscles
3D scapular kinematics



Ann Cools Odense march 2022

Analysis of Scapular Kinematics and Muscle Activity by Use of Fine-Wire Electrodes During Shoulder Exercises

Kelly Berckmans,^{**†} PT, Birgit Castelein,[†] PT, PhD, Dorien Borms,[†] PT, PhD, Tanneke Palmans,[†] Thierry Parlevliet,[‡] MD, and Ann Cools,[†] PT, PhD
Investigation performed at Ghent University, Ghent, Belgium



3D-results

	X-axis (°) AT (-) / PT (+)	Y-axis (°) DR (-) / UR (+)	Z-axis (°) IR (-) / ER (+)
IG	-7.19 ±6.96	23.91 ±14.52	-31.30 ±6.95
LR	-8.83 ±5.49	3.08 ±5.13	-42.32 ±15.04
LM	.915 ±4.89	29.24 ±8.47	-14.97 ±9.90
RB	-7.04 ±5.79	30.32 ±9.66	-13.34 ±12.49

Ann Cools Odense March 2022

EMG-results

Muscle	IG	LR	LM	RB
UT	9.32 ±5.16	7.39 ±4.17	20.60 ±12.23	23.49 ±11.46
MT	18.38 ±9.87	25.66 ±12.39	36.21 ±17.36	38.70 ±22.18
LT	12.31 ±5.83	13.26 ±11.38	29.20 ±14.90	24.42 ±12.15
SA	20.27 ±13.88	18.35 ±17.92	20.42 ±13.42	14.85 ±11.93
LS	27.35 ±22.62	36.37 ±27.98	49.39 ±34.89	58.05 ±40.23
RM	27.51 ±14.10	27.02 ±14.95	58.68 ±25.17	66.12 ±39.66
Pm	44.36 ±37.65	34.06 ±38.43	9.53 ±10.99	11.85 ±22.20



Summary of research for the clinician:

(Edwards JOSPT 2017, Cools AJSM 2007, Castelein Man Ther 2015, Castelein JOSPT 2016, Spanhove, Physiotherapy 2019, Cools AJSM 2014, Borms AJSM 2016, Levy JSES 2008)

- ✓ Performing **ER** may decrease subacromial pressure, activates the supra- and infraspinatus , increases activity in LT and decreases activity Pmin
- ✓ Making a **fist** during exercises increases RC activity
- ✓ **NOT** making a **fist** during the exercises increases posterior scapular muscle activity
- ✓ **Low load closed chain exercises** (bench & wall slides) allow us to train elevation with minimal load on the RC
- ✓ **Diagonal patterns and challenging the core** increase scapular muscle activity

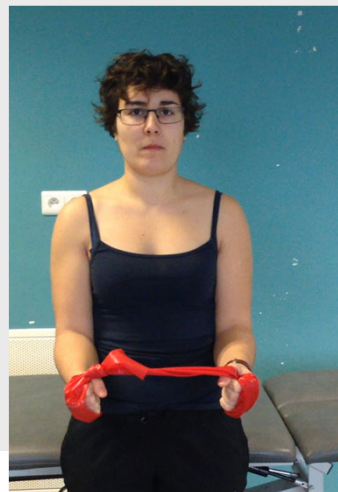
Ann Cools Odense March 2022



Summary of research for the clinician:

(Edwards JOSPT 2017, Cools AJSM 2007, Castelein Man Ther 2015, Castelein JOSPT 2016, Spanhove, Physiotherapy 2019, Cools AJSM 2014, Borms AJSM 2016, Levy JSES 2008, Borms JAT 2019)

- ✓ Performing **ER** may decrease subacromial pressure, activates the supra- and infraspinatus , increases activity in LT and decreases activity Pmin



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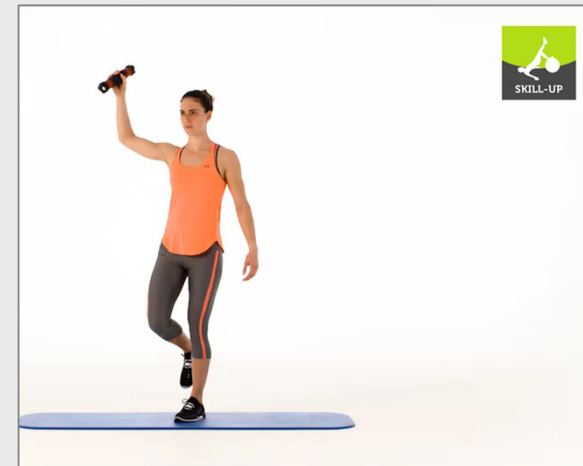
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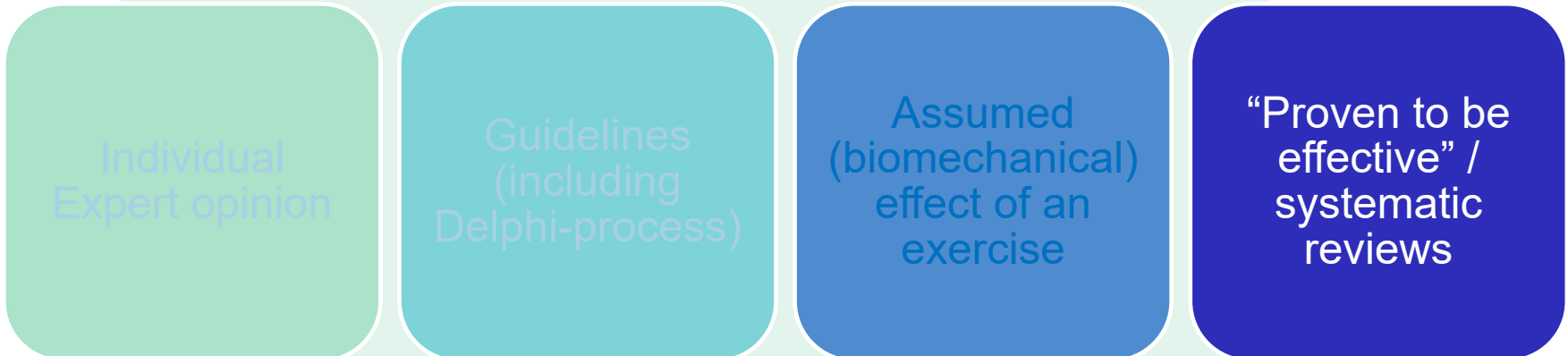
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✓ Diagonal patterns and challenging the core increase scapular muscle activity



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Individual
Expert opinion

Guidelines
(including
Delphi-process)

Assumed
(biomechanical)
effect of an
exercise

“Proven to be
effective” /
systematic
reviews

Management of adults with primary frozen shoulder in secondary care (UK FROST): a multicentre, pragmatic, three-arm, superiority randomised clinical trial

Amar Rangan, Stephen D Brealey, Ada Kedling, Belen Corbacho, Matthew Northgraves, Lorna Goodrich, Lorna Goodrich, C. S. Kesavan, Saleema Rex, Charalambos P Charalambous, Nigel Hanchard, Allison Armstrong, Andrew Brooks, Andrew Carr, Cushla Cooper, David J Dias, Iona Donnelly, Catherine Hewitt, Sarah E Lamb, Catriona McDavid, Gerry Richardson, Sara Rodgers, Sally Spence, David T. Wilson, Francine Toye, on behalf of the UK FROST Study Group



Progressive exercise compared with best practice advice, with or without corticosteroid injection, for the treatment of patients with rotator cuff disorders (GRASP): a multicentre, pragmatic, 2 x 2 factorial, randomised controlled trial

Sally Hopwood, John J Keene, Ioana R Marin, Peter D Dritsaki, Peter Heine, Lucy Cureton, Susan J Dutton, Helen Dakin, Andrew Carr, Willie Hooper, Anju Jaggi, Karen L Barker, Alastair Gray, Sarah E Lamb, on behalf of the GRASP Trial Group*



“Proven to be effective” / systematic reviews

THE LANCET

Arthroscopic subacromial decompression in subacromial shoulder pain (CSAW): a multicentre, pragmatic, parallel group, placebo-controlled, three-group, randomised surgical trial

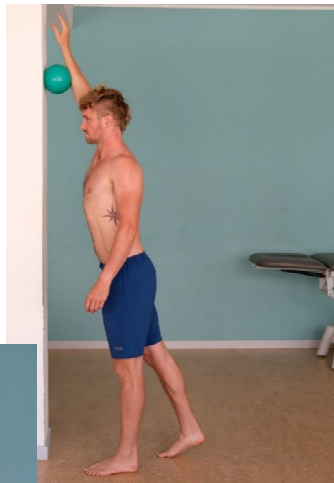
David J Beard, Jonathan L Rees, Jonathan A Cook, Ines Rombach, Cushla Cooper, Naomi Merritt, Beverly A Shirkey, Jenny L Donovan, Stephen Gwilym, Julian Savulescu, Jane Moser, Alastair Gray, Marcus Jepson, Irene Tracey, Andrew Judge, Karolina Wartolowska, Andrew J Carr, on behalf of the CSAW Study Group*



Excellent study design, and However homogeneous group and standardized exercise program...

A 12-WEEK **TAILORED HOME-BASED REHABILITATION PROGRAM** BASED ON LEVEL OF IRRITABILITY, RANGE OF MOTION AND STRENGTH DEFICITS IN PATIENTS WITH DEGENERATIVE ROTATOR CUFF TEARS: A CLINICAL PILOT STUDY

Cools AM, Maenhout A, Van Thuyne F, Veramme T, Verhofstadt N, Van Tongel A, Master Thesis 2020



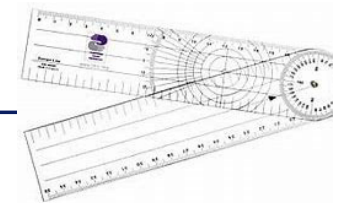
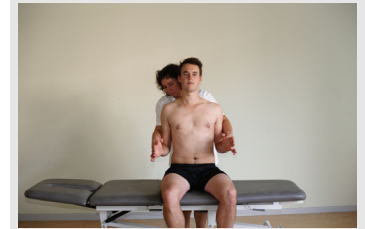
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Pain at night

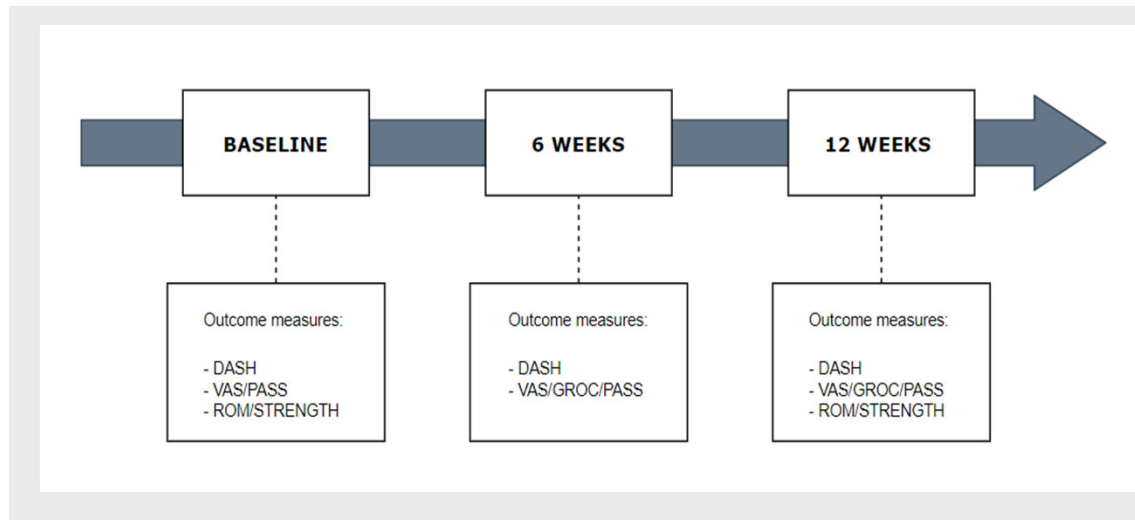


Painful ER
resistance



A 12-WEEK TAILORED HOME-BASED REHABILITATION PROGRAM BASED ON LEVEL OF IRRITABILITY, RANGE OF MOTION AND STRENGTH DEFICITS IN PATIENTS WITH DEGENERATIVE ROTATOR CUFF TEARS: A CLINICAL PILOT STUDY

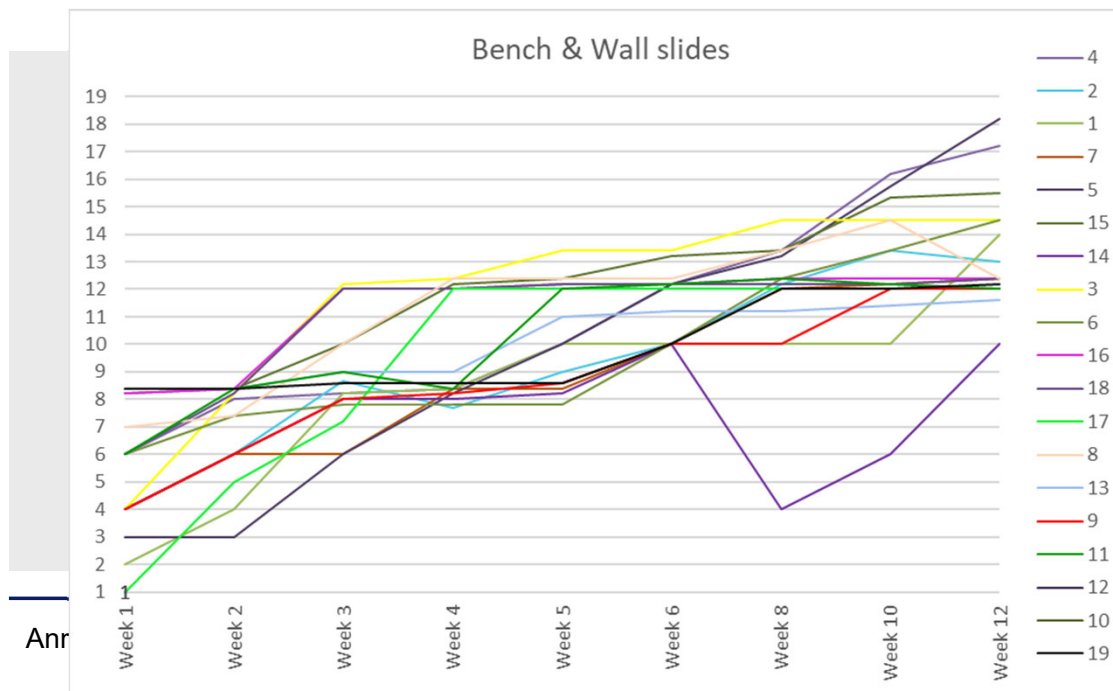
Cools AM, Maenhout A, Van Thuyne F, Veramme T, Verhofstadt N, Van Tongel A, Master Thesis 2



Ann Cools Odense March 2022

A 12-WEEK TAILORED HOME-BASED REHABILITATION PROGRAM BASED ON LEVEL OF IRRITABILITY, RANGE OF MOTION AND STRENGTH DEFICITS IN PATIENTS WITH DEGENERATIVE ROTATOR CUFF TEARS: A CLINICAL PILOT STUDY

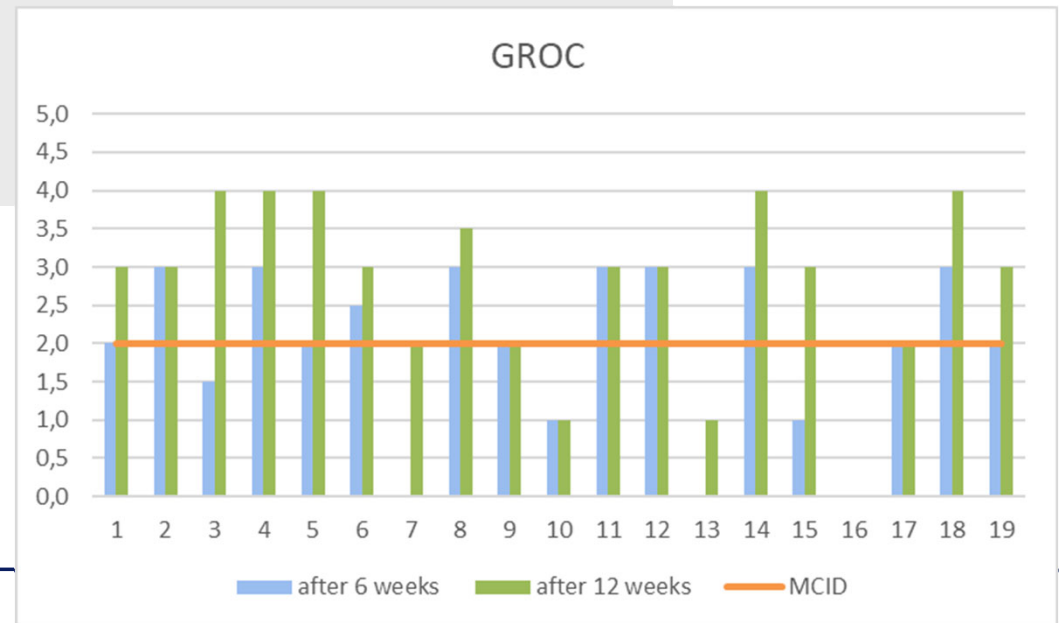
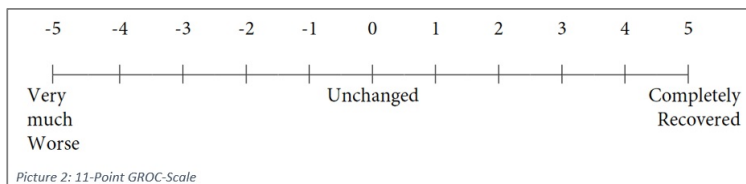
Cools AM, Maenhout A, Van Thuyne F, Veramme T, Verhofstadt N, Van Tongel A, Master Thesis 2



A 12-WEEK TAILORED HOME-BASED REHABILITATION PROGRAM BASED ON LEVEL OF IRRITABILITY, RANGE OF MOTION AND STRENGTH DEFICITS IN PATIENTS WITH DEGENERATIVE ROTATOR CUFF TEARS: A CLINICAL PILOT STUDY

Cools AM, Maenhout A, Van Thuyne F, Veramme T, Verhofstadt N, Van Tongel A, Master Thesis 2020

GROC = Global Rate of Change



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A 12-WEEK TAILORED HOME-BASED REHABILITATION PROGRAM BASED ON LEVEL OF IRRITABILITY, RANGE OF MOTION AND STRENGTH DEFICITS IN PATIENTS WITH DEGENERATIVE ROTATOR CUFF TEARS: A CLINICAL PILOT STUDY

Cools AM, Maenhout A, Van Thuyne F, Veramme T, Verhofstadt N, Van Tongel A, Master Thesis 2020

PASS = Patient Acceptable Symptom State



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Individual
Expert opinion

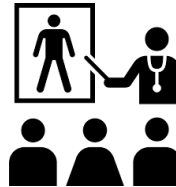
Guidelines
(including
Delphi-process)

Assumed
(biomechanical)
effect of an
exercise

“Proven to be
effective” /
systematic
reviews

What does best practice care for musculoskeletal pain look like? Eleven consistent recommendations from high-quality clinical practice guidelines: systematic review

Ivan Lin ¹, Louise Wiles, ² Rob Waller, ³ Roger Goucke, ⁴ Yusuf Nagree, ^{5,6} Michael Gibberd, ⁷ Leon Straker ⁸, Chris G Maher, ⁹ Peter P B O'Sullivan ¹⁰



Ann Cools Odense March 2022

Thank you!

Box 2 Consistent recommendations across musculoskeletal (MSK) pain conditions

1. Care should be patient centred. This includes care that responds to the individual context of the patient, employs effective communication and uses shared decision-making processes.
2. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions.
3. Assess psychosocial factors.
4. Radiological imaging is discouraged unless:
 - i. Serious pathology is suspected.
 - ii. There has been an unsatisfactory response to conservative care or unexplained progression of signs and symptoms.
 - iii. It is likely to change management.
5. Undertake a physical examination, which could include neurological screening tests, assessment of mobility and/or muscle strength.
6. Patient progress should be evaluated including the use of outcome measures.
7. Provide patients with education/information about their condition and management options.
8. Provide management addressing physical activity and/or exercise.
9. Apply manual therapy only as an adjunct to other evidence-based treatments.
10. Unless specifically indicated (e.g. red flag condition), offer evidence-informed non-surgical care prior to surgery.
11. Facilitate continuation or resumption of work.