

Can Telerehabilitation Replace Traditional Care?

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Professor
Duke University



Background

- BS PT 1990
- MBA 1999
- PHD 2003
- Cert. Chronic Pain Management 2016
- Researcher
- Educator
- Duke University

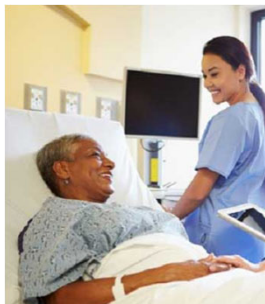


Disclosures

- *Financial:*
 - Research Consultant for the Hawkins Foundation of the Carolinas
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 - Royalties from AgenceEBP
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 - Senior Associate Editor for BJSM
 - Editorial Board member for J Physiotherapy and JMMT

Objectives

- Discuss the natural history of physical therapist point of care emphases over time
- Define telehealth
- Review the evidence associated with telehealth
- Discuss best practice methods for telehealth
- Introduce my background in telehealth



1989 Hospital DRGs



1990's CORFs



95-2005 Home Health



1998 Outpatient



1989 Hospital DRGs



1990's CORFs



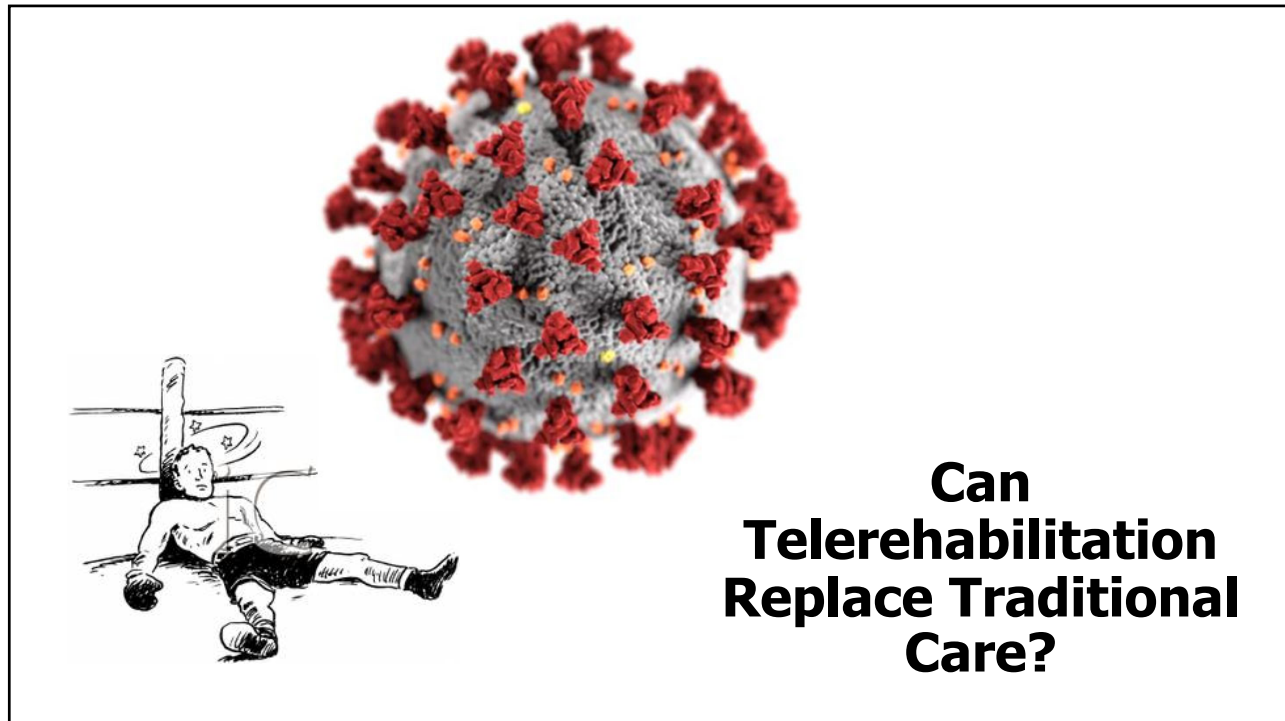
95-2005 Home Health



1998 Outpatient



2020 Telehealth?



What Has Driven and Will Drive Telehealth Use?

- Innovation in technology (e.g., apps, wearable sensors with wireless monitoring capabilities), which will continue to attract financial capital for product development;
- Advancement in electronic health records and clinical-decision support systems, which may better integrate telehealth services into care-delivery processes and thus make care delivery more efficient for clinicians;

<https://www.ncbi.nlm.nih.gov/pubmed/29045204>

What Has Driven and Will Drive Telehealth Use?

- Projected shortages in the health professional workforce, which will increase the need to provide access to care for rural and underserved urban populations;
- Reorganization in the delivery and financing of medical care, which provides an incentive for service delivery in lower cost care settings;
- Growth of consumerism in health care, with increasing public expectations for convenient and real-time access to health services

<https://www.ncbi.nlm.nih.gov/pubmed/29045204>

What Exactly is Telehealth?

Telehealth



- Telehealth is the **use of electronic information and telecommunications technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health and health administration.**

Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services 2019

Telehealth Types

- **LIVE VIDEO (SYNCHRONOUS)**
 - Often referred to as "real-time," synchronous telehealth tools facilitate live, two-way interactions between patients, caregivers and providers using audiovisual technologies.
 - May involve "leading" a session in which a PTA is there to support the care flow
- **STORE-AND-FORWARD (ASYNCHRONOUS)**
 - Store-and-forward telemedicine involves the secure transmission of pre-recorded materials such as educational tools.
- **REMOTE PATIENT MONITORING (RPM) (SYNCHRONOUS)**
 - Generally uses remote devices, which are known as probes or monitors.
 - This helps practitioners ensure efficient network infrastructure control and management.

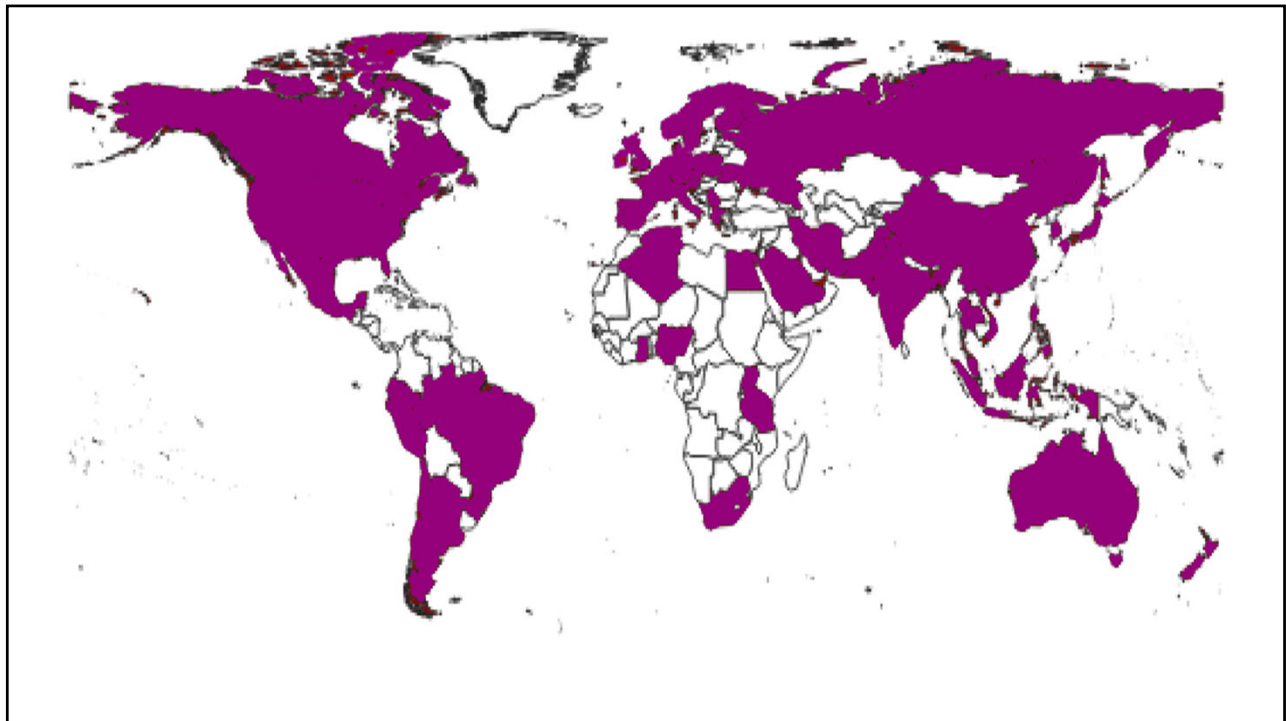
Theoretical Benefits of Telehealth

- Time-efficient and convenient
- Should reduce “no shows” and cancellations
- Potentially less expensive for the end user
- Potentially useful for those with SDoH concerns (access challenges)
- Promotes engagement
- Promotes adherence
- Promotes self-management

Who Uses It?

- Using telemedicine to store and forward patient data was most common among:
 - Radiologists (42.7 percent)
 - Pathologists (22.7 percent)
 - Cardiologists (14.9 percent)
- Use of remote patient monitoring was most common among:
 - Cardiologists (17.9 percent)
 - Nephrologists (15.4 percent)
 - Neurologists (12.8 percent)

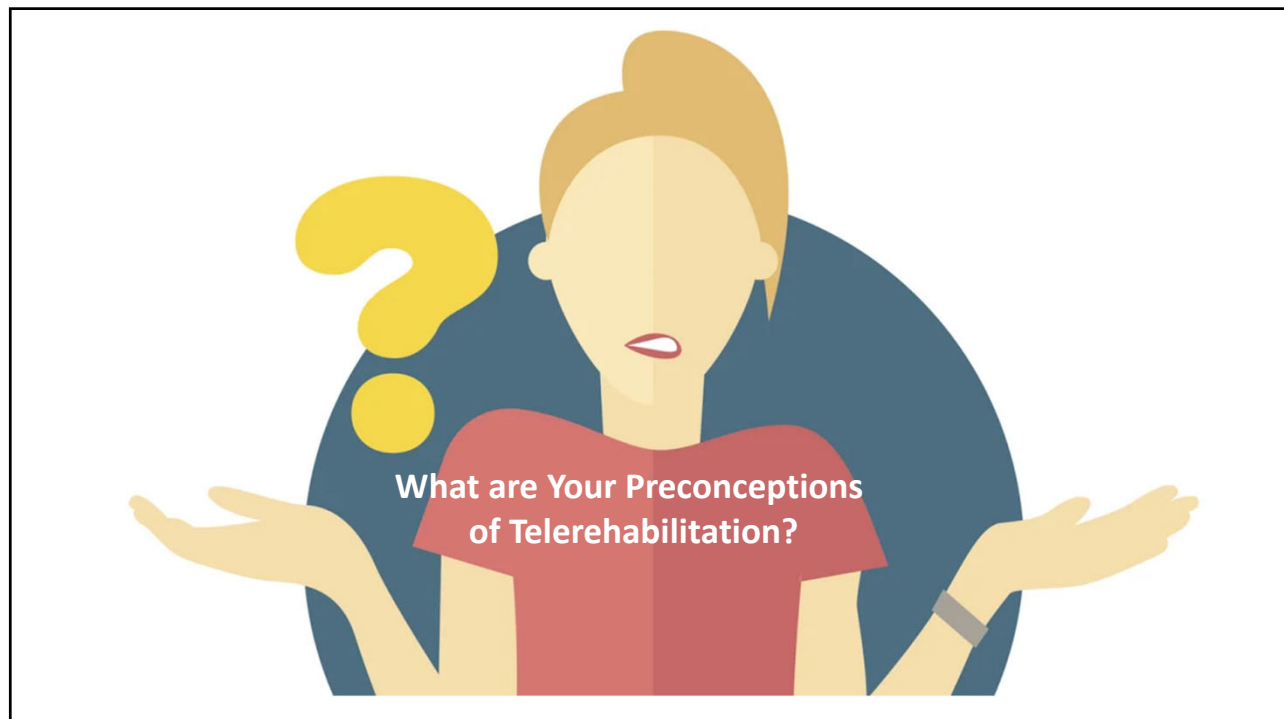
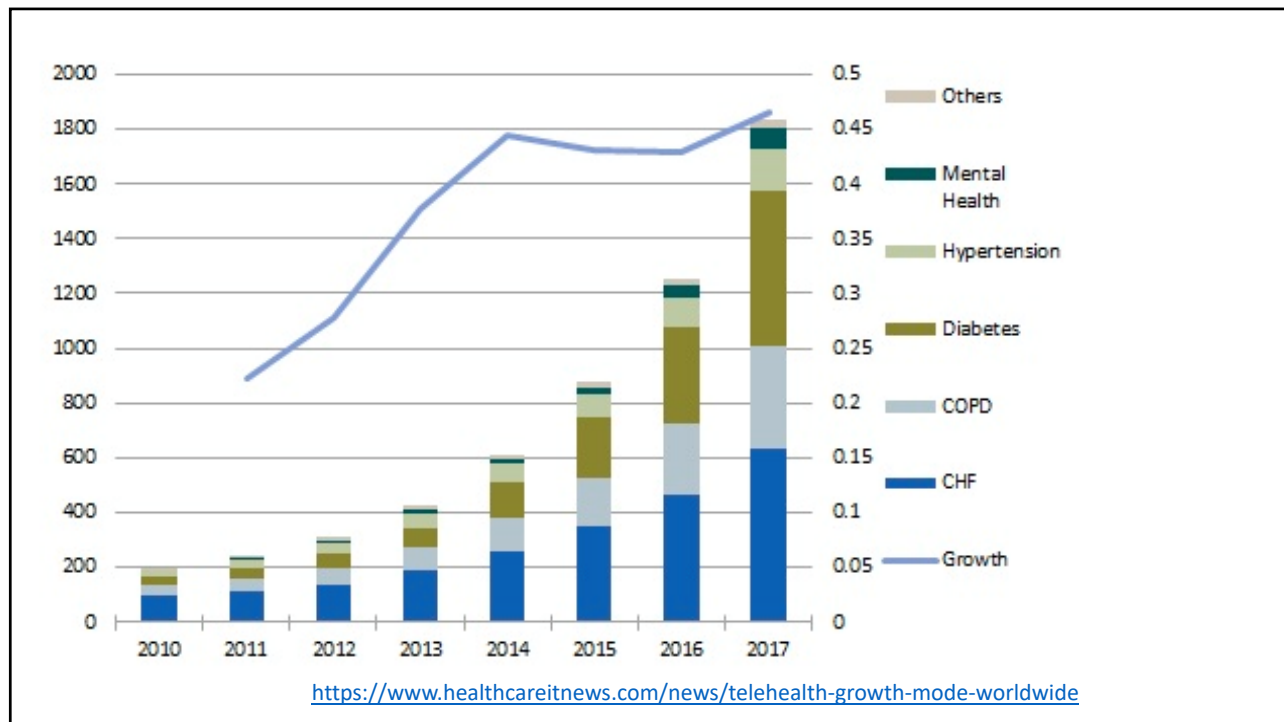
<https://www.ama-assn.org/press-center/press-releases/ama-offers-first-national-estimate-telemedicine-use-physicians>



Telehealth was Growing.....However...



- Non-hospital-based telehealth fueled the surge in the burgeoning technology's growth, rising 1,393% from 2014 to 2018, according to Fair Health's new white paper.
- Telehealth overall grew **624%** from 0.0192% of all commercial insurance claims in 2014 to **0.1394%** in 2018.



Qualitative Study

- “Physiotherapists believed that the “hands-off” nature of telephone consultations helped shift patient expectations of care, leading to better **patient engagement** in self-management and improved adherence to prescribed exercise”.

<https://www.ncbi.nlm.nih.gov/pubmed/29885026>

**What Does the Evidence
Say about Telehealth?**

Telehealth vs. Internet Based Exercises

Table 2. Mean Scores on Continuous Outcome Measures Across Time, by Group*

Outcome	Baseline		Month 3		Month 9	
	Intervention (n = 74)	Control (n = 74)	Intervention (n = 70)	Control (n = 69)	Intervention (n = 66)	Control (n = 67)
Primary						
Pain during walking (NRS)†	6.1 (1.4)	6.2 (1.3)	3.3 (2.2)	5.1 (2.0)	3.6 (2.2)	4.7 (2.5)
Physical function (WOMAC)‡	33.1 (8.0)	32.5 (8.3)	18.3 (10.7)	27.6 (11.7)	18.7 (10.2)	25.7 (11.6)
Secondary						
Knee pain (WOMAC)§	9.0 (2.4)	9.2 (2.5)	5.1 (2.7)	7.7 (3.3)	5.1 (2.9)	6.9 (3.5)
Quality of life (AQoL-2)	0.7 (0.2)	0.7 (0.1)	0.8 (0.1)	0.7 (0.1)	0.8 (0.2)	0.7 (0.2)
Self-efficacy (ASES)¶						
Pain	6.1 (1.8)	5.9 (1.8)	7.6 (2.0)	5.7 (2.1)	7.5 (2.0)	6.2 (1.8)
Function	7.6 (1.6)	7.5 (1.4)	8.6 (1.4)	7.8 (1.6)	8.6 (1.8)	7.9 (1.4)
Pain catastrophizing (PCS)**	8.8 (9.2)	10.1 (9.6)	5.7 (6.3)	9.4 (9.4)	6.2 (7.4)	9.3 (8.7)
Coping attempts (CSQ)††	61.7 (24.9)	65.7 (24.9)	72.7 (26.1)	69.8 (23.3)	74.6 (26.6)	67.0 (28.0)

Table 3—Continued

Difference in Change Between Groups†			
Baseline to Month 3	P Value	Baseline to Month 9	P Value
1.6 (0.9 to 2.3)	<0.001	1.1 (0.4 to 1.8)	0.003
9.3 (5.9 to 12.7)	<0.001	7.0 (3.4 to 10.5)	<0.001
2.5 (1.5 to 3.5)	<0.001	1.6 (0.6 to 2.6)	0.003
-0.1 (-0.1 to 0)	0.023	-0.1 (-0.1 to 0)	0.018
-1.9 (-2.5 to -1.2)	<0.001	-1.2 (-1.9 to -0.6)	<0.001
-0.7 (-1.2 to -0.2)	0.006	-0.4 (-0.9 to 0.1)	0.093
0.7 (0.2 to 1.1)	0.006	0.5 (0 to 1.0)	0.049
-5.3 (-12.4 to 1.8)	0.142	-11.6 (-18.7 to -4.4)	0.002

<https://www.ncbi.nlm.nih.gov/pubmed/28241215>

Systematic Review for Chronic Pain

- Telemedicine versus **no intervention** showed significantly lower pain scores (MD -0.57, 95%CI -0.81; -0.34)
- But not for telemedicine versus **usual care** (MD -0.08, 95%CI -0.41; 0.26) or in addition to usual care (MD -0.25, 95%CI -1.50; 1.00).
- Telemedicine compared to **no intervention** showed non-significant effects for PA (MD 19.93 min/week, 95%CI -5.20; 45.06) and significantly diminished ADL limitations (SMD -0.20, 95%CI -0.29; -0.12).

Adamse, C., Dekker-Van Weering, M. G., van Etten-Jamaludin, F. S., & Stuiver, M. M. (2018). The effectiveness of exercise-based telemedicine on pain, physical activity and quality of life in the treatment of chronic pain: A systematic review. *Journal of Telemedicine and Telecare*, 24(8), 511–526.

Systematic Review for Chronic Pain

- No differences were found for telemedicine **in addition to usual care** for PA or for ADL (SMD 0.16, 95% CI -0.66; 0.34).
- Telemedicine versus **usual care** showed no differences for ADL (SMD 0.08, 95% CI -0.37; 0.53).
- No differences were found for telemedicine compared to the **three control groups** for QoL.

Adamse, C., Dekker-Van Weering, M. G., van Etten-Jamaludin, F. S., & Stuiver, M. M. (2018). The effectiveness of exercise-based telemedicine on pain, physical activity and quality of life in the treatment of chronic pain: A systematic review. *Journal of Telemedicine and Telecare*, 24(8), 511–526.

For All MSK Conditions-Disability/Function

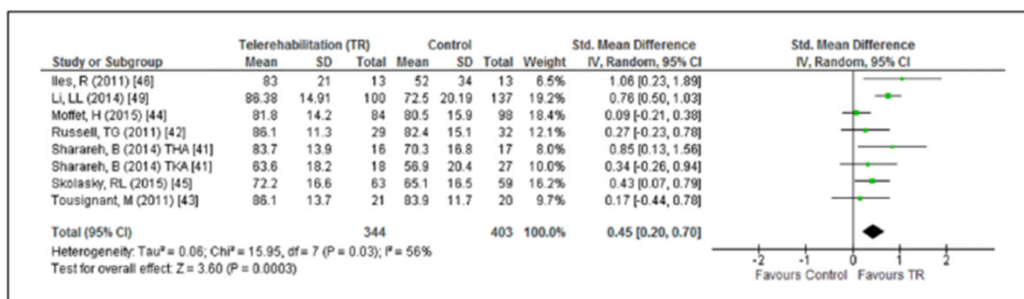


Figure 2. Meta-analysis comparing the effect of telerehabilitation on physical function and disability following intervention for all conditions.

For all measures, comparator groups included usual care, usual PT, decision aides, or coaching sessions

<https://www.ncbi.nlm.nih.gov/pubmed/27141087>

For All MSK Conditions-Pain

Cottrell et al.

633

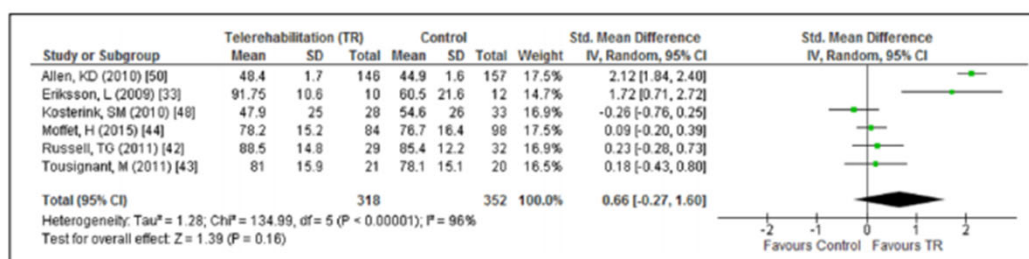
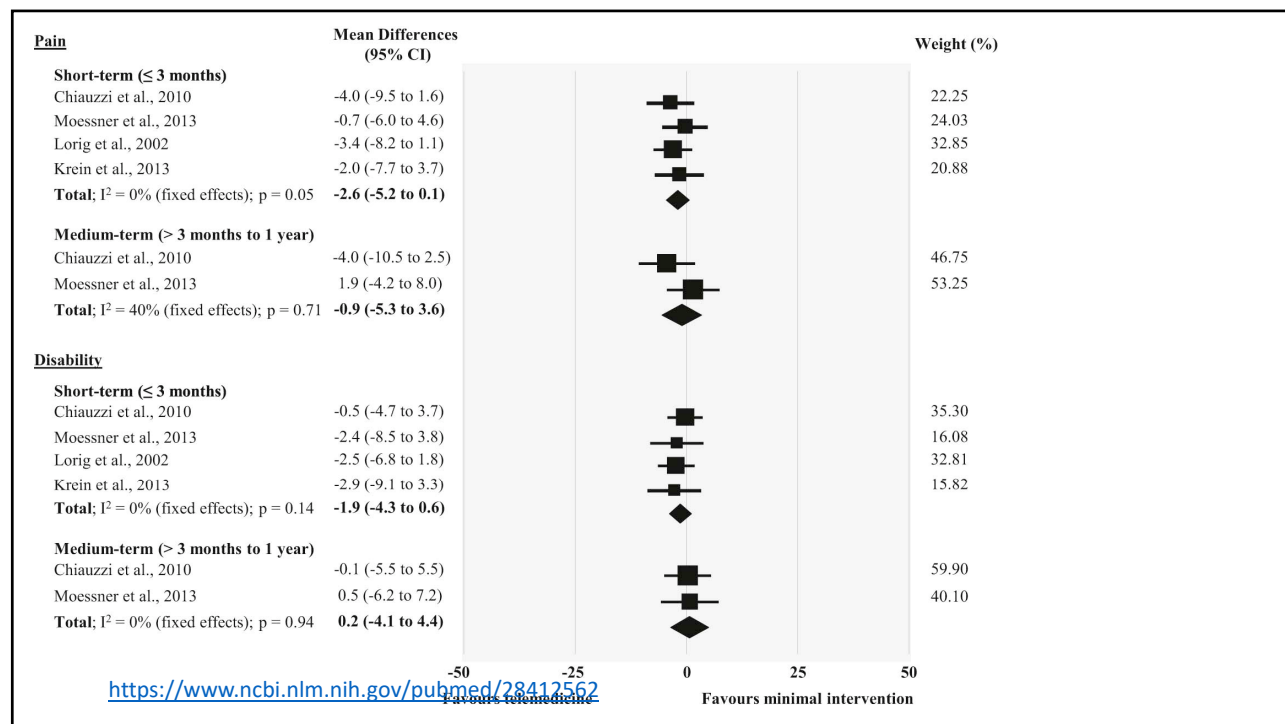


Figure 3. Meta-analysis comparing the effect of telerehabilitation on pain following intervention for all conditions.

<https://www.ncbi.nlm.nih.gov/pubmed/27141087>

- Moderate-quality evidence that current telehealth interventions, alone, are not more effective than minimal interventions for reducing pain and disability in chronic LBP.

<https://www.ncbi.nlm.nih.gov/pubmed/28412562>



Patient Adherence (Systematic Review)

- Compliance was good with blood pressure, heart failure and stroke, diabetes, asthma, chronic obstructive pulmonary disease and other respiratory diseases.
- In general, good compliance at the start of a study was found to drop off over time, most rapidly in the period immediately after the start.
- Success factors included the extent of patient health education, telehealth system implementation style, user training and competence in system usage, active human support from the healthcare provider and maintaining strong participant motivation.

<https://www.ncbi.nlm.nih.gov/pubmed/26556057>

Cost Savings to Patient

- Two physical therapy studies evaluated costs
- One of the studies found cost savings in favor of telehealth

<https://www.ncbi.nlm.nih.gov/pubmed/28403669>

What! No Hand's On?



Annals of Internal Medicine

ORIGINAL RESEARCH

Spinal Manipulation, Medication, or Home Exercise With Advice for Acute and Subacute Neck Pain

A Randomized Trial

Gert Bronfort, DC, PhD; Roni Evans, DC, MS; Alfred V. Anderson, DC, MD; Kenneth H. Svendsen, MS; Yisrah Bracha, MS; and Richard H. Grimm, MD, MPH, PhD

Background: Mechanical neck pain is a common condition that affects an estimated 70% of persons at some point in their lives. Little research exists to guide the choice of therapy for acute and subacute neck pain.

Objective: To determine the relative efficacy of spinal manipulation therapy (SMT), medication, and home exercise with advice (HEA) for acute and subacute neck pain in both the short and long term.

Design: Randomized, controlled trial. (ClinicalTrials.gov registration number: NCT00029770)

Setting: 1 university research center and 1 pain management clinic in Minnesota.

Participants: 272 persons aged 18 to 65 years who had nonspecific neck pain for 2 to 12 weeks.

Intervention: 12 weeks of SMT, medication, or HEA.

Measurements: The primary outcome was participant-rated pain, measured at 2, 4, 8, 12, 26, and 52 weeks after randomization. Secondary measures were self-reported disability, global improvement, medication use, satisfaction, general health status (Short Form-36 Health Survey physical and mental health scales), and

adverse events. Blinded evaluation of neck motion was performed at 4 and 12 weeks.

Results: For pain, SMT had a statistically significant advantage over medication after 8, 12, 26, and 52 weeks ($P \leq 0.010$), and HEA was superior to medication at 26 weeks ($P = 0.02$). No important differences in pain were found between SMT and HEA at any time point. Results for most of the secondary outcomes were similar to those of the primary outcome.

Limitations: Participants and providers could not be blinded. No specific criteria for defining clinically important group differences were prespecified or available from the literature.

Conclusion: For participants with acute and subacute neck pain, SMT was more effective than medication in both the short and long term. However, a few instructional sessions of HEA resulted in similar outcomes at most time points.

Primary Funding Source: National Center for Complementary and Alternative Medicine, National Institutes of Health.

Ann Intern Med. 2012;156:1-10.
For author affiliations, see end of text.

www.annals.org

What's Missing?

- Fidelity studies
- Long-term outcomes
- Study of recurrence rates
- Recommendations of Best platforms
- How to best incorporate decision aides and technology with remote engagement
- How to bump up the end users technological savvy

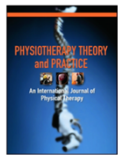


How Can I Provide Quality Telehealth?

Premise of Telehealth



Therapeutic Alliance

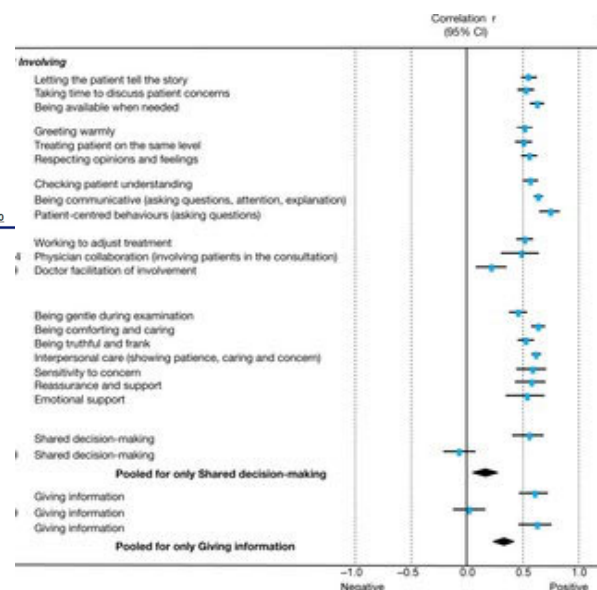


Physiotherapy Theory and Practice
An International Journal of Physical Therapy

ISSN: 0959-3985 (Print) 1532-5040 (Online) journal homepage: <http://www.tandfonline.com/loi/jptp20>

The impact of therapeutic alliance in physical therapy for chronic musculoskeletal pain: A systematic review of the literature

Meredith Kinney, Jasmine Seider, Amanda Floyd Beaty, Kaitlin Coughlin, Maximilian Dyal & Derek Clewley



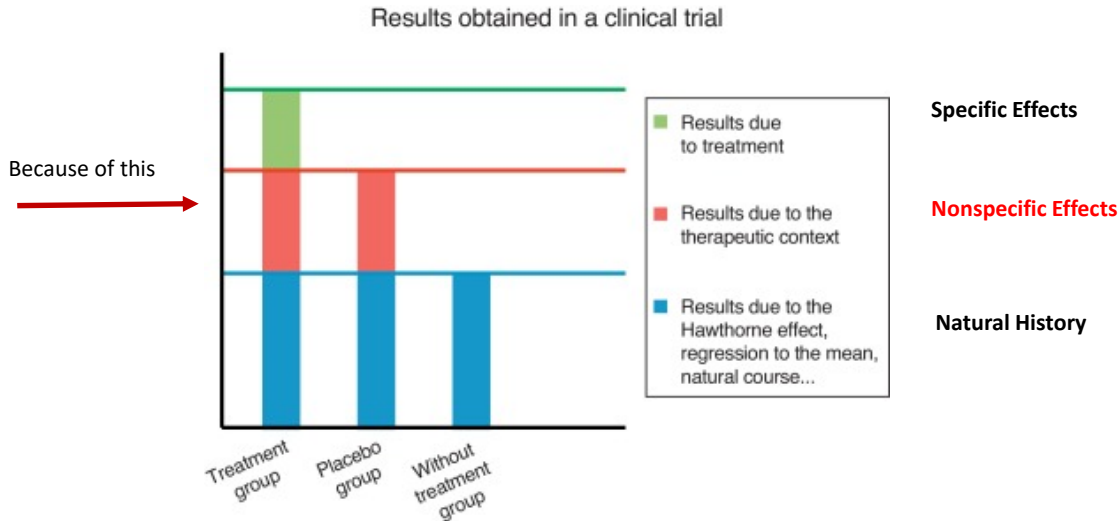
Sizing up the Patient Engagement Options in Telehealth

- The “care recipient” should be conceived as a crucial member in the phases of planning and delivery of the health care services
- In other words, **patients should be considered one of the crucial human resources in the health care organization and as part of the care team**



Why is this important, man?

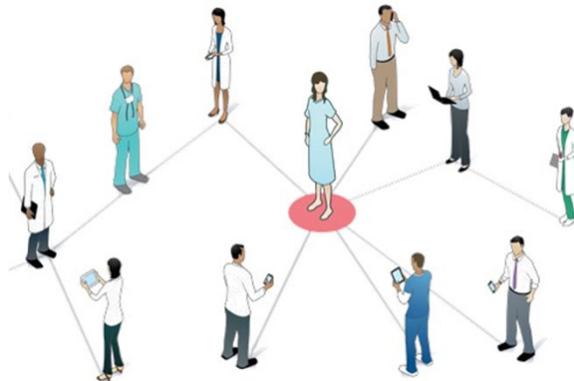
The Role of Patient Engagement



<https://www.sciencedirect.com/science/article/abs/pii/S2387020617303996>

Patient Engagement Requires Shared Decision Making

- Shared decision making is patient specific, and relies on the medical evidence, the provider's clinical expertise, and the unique attributes of the patient and his or her family



<https://www.ncbi.nlm.nih.gov/pubmed/23381520>

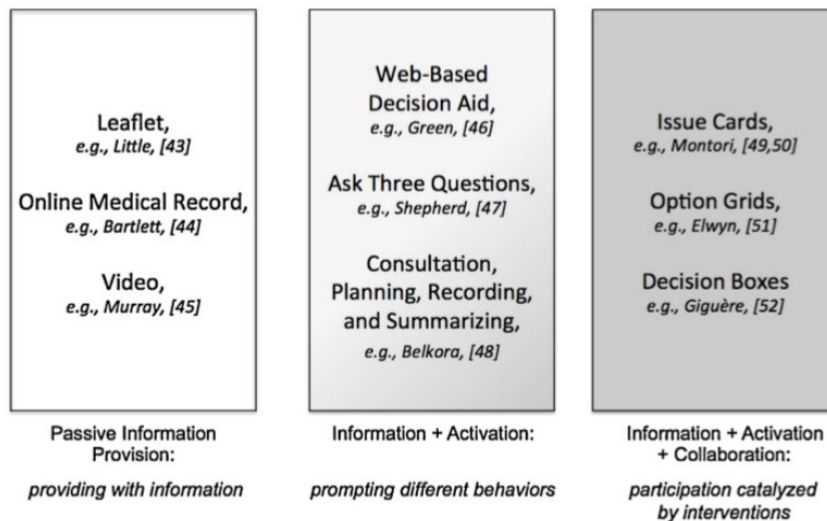
Shared Decision Making

- Three essential elements must be present for shared decision making to occur.
 - First, both the health care provider and the patient must recognize and acknowledge that a decision is, in fact, required.
 - Second, they must both know and understand the best available evidence concerning the risks and benefits of each option.
 - Third, decisions must take into account both the provider's guidance and the patient's values and preferences.

<https://www.ncbi.nlm.nih.gov/pubmed/23381520>

What are the Current Strategies, Worst to Best?

S.W. Grande et al. / Patient Education and Counseling 95 (2014) 281–287



* Darker shading indicates increasing levels of activation and collaboration.

Handouts, Pamphlets, HEP Booklets, etc.

Journal of Physiotherapy 63 (2017) 161–167



Journal of
PHYSIOTHERAPY

journal homepage: www.elsevier.com/locate/jphys

Research

An app with remote support achieves better adherence to home exercise programs than paper handouts in people with musculoskeletal conditions: a randomised trial

Tara E Lambert^a, Lisa A Harvey^{b,c}, Christos Avdalis^a, Lydia W Chen^a, Sayanthinie Jeyalingam^a,
Carin A Pratt^a, Holly J Tatum^a, Jocelyn L Bowden^{b,c}, Barbara R Lucas^a

^a Physiotherapy Department, Royal North Shore Hospital; ^b John Walsh Centre for Rehabilitation Research, Sydney School of Medicine; ^c Kolling Institute, Royal North Shore Hospital, Sydney, Australia

Mobile Apps

JMIR MHEALTH AND UHEALTH

Najm et al

Review

Mobile Health Apps for Self-Management of Rheumatic and Musculoskeletal Diseases: Systematic Literature Review

Aurélien Najm^{1,2}, MSc, MD; Laure Gossec^{3,4}, MD, PhD; Catherine Weill⁵, PhD; David Benoist⁵, PhD; Francis Berenbaum⁶, MD, PhD; Elena Nikiphorou⁷, MD, PhD

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²INSERM UMR 1238, Nantes University of Medicine, Nantes, France

³INSERM UMR S1136, Institut Pierre Louis d'Epidémiologie et de Santé Publique, Sorbonne Université, Paris, France

⁴Rheumatology department, Pitié Salpêtrière Hospital, AP-HP, Paris, France

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⁶Department of rheumatology, Sorbonne Université, INSERM CRSA Saint-Antoine, AP-HP, Saint Antoine Hospital, Paris, France

⁷Department of Inflammation Biology, School of Immunology and Microbial Sciences, Faculty of Life Sciences & Medicine, King's College London, Paris, France

The development process of most apps was of low or moderate quality in many studies.

Optimal standards and quality assurance of new apps are mandatory.

Web Based Decision Aides



During the COVID-19 pandemic, should I go to live elsewhere or stay in my retirement/assisted living home?

The decision about moving from a retirement or assisted living home to the home of family (or a friend) during a pandemic can be difficult. Working through the 5 steps of this decision aid should help prepare you and your loved ones for making this important decision.

This decision aid is for you and/or your family/friend if:

- you live in a retirement home or an assisted living home
- you are thinking about moving to live with family/friend(s) during the COVID-19 pandemic

- <https://decisionaid.ohri.ca/>

“Ask Three Questions”

- 1. What are my options?
- 2. What are the possible benefits and harms of those options?
- 3. How likely are the benefits and harms of each option to occur?

<https://www.ncbi.nlm.nih.gov/pubmed/21831558>

Decision Boxes

- Patient decision aids can only go so far: patients want their healthcare provider's input on their care
- Decision boxes integrate the best available evidence from studies and syntheses to provide quantitative information on management options. It is specialized to cover medical questions that have no single best answer.

STAKEHOLDERS & VALUES <small>(list primary stakeholders and what they value)</small>	
Gather Ethics Information	
MEDICAL INDICATIONS	PATIENT PREFERENCES
QUALITY OF LIFE	CONTEXTUAL FEATURES
WHAT IS THE ETHICS QUESTION? <small>(ask the team)</small>	

<https://implementationscience.biomedcentral.com/track/pdf/10.1186/1748-5908-7-72>

1

Option Grids

- <https://optiongrid.ebsco.com/decision-aids/atrial-fibrillation--treatment-options-to-lower-stroke-risk>
- Option Grids are patient decision aids that are based on the best possible medical research, and input from patients and healthcare professionals.
- Option grids are easy to read and easy to use.
- They can provide a percent risk given your current situation
- They can ensure that important medical decisions are well-informed and made carefully, by considering patients' views.

What Prevents Successful Engagement?

Personal Characteristics

- Older age
- Selected ethnicity
- Level of income
- Beliefs about one's role in own decision making in healthcare
- Patient engagement personality
- SDoH

Care Environment Characteristics

- Role identify of health professional
- Care givers willingness to engage
- Clinical use of shared decision making
- Practice culture
- Organizational commitment
- Sensitivity to health literacy and tech literacy of patients

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6056150/>

My Background in Telehealth



NEW ZEALAND
MANIPULATIVE
PHYSIOTHERAPISTS
ASSOCIATION INC.



Prof. Kim Bennell
BAppSci(physio), PhD



PT versus PT plus telehealth coaching

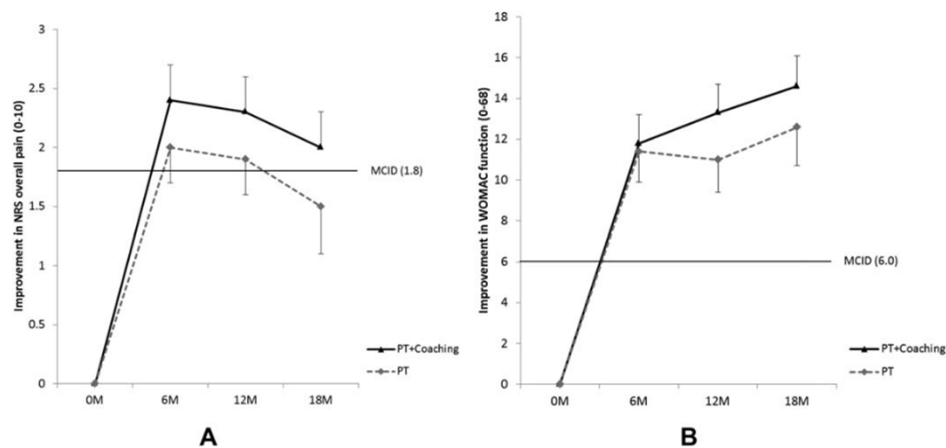


Figure 2. Mean \pm SE improvement in primary outcomes. **A**, Overall knee pain (measured via numeric rating scale [NRS]) and **B**, physical function (measured via Western Ontario and McMaster Universities Osteoarthritis Index [WOMAC]), in the physiotherapy (PT)+coaching and PT-only groups, at baseline (0M), 6 months (6M), 12 months (12M), and 18 months (18M). The horizontal line indicates the minimum clinically important difference (MCID).

<https://www.ncbi.nlm.nih.gov/pubmed/27111441>

PEERC Trial

SW. Grande et al. / Patient Education and Counseling 95 (2014) 281–287

Passive Information Provision: providing with information	Information + Activation: prompting different behaviors	Information + Activation + Collaboration: participation catalyzed by interventions
Leaflet, e.g., Little, [43] Online Medical Record, e.g., Bartlett, [44] Video, e.g., Murray, [45]	Web-Based Decision Aid, e.g., Green, [46] Ask Three Questions, e.g., Shepherd, [47] Consultation, Planning, Recording, and Summarizing, e.g., Belkora, [48]	Issue Cards, e.g., Montori, [49,50] Option Grids, e.g., Elwyn, [51] Decision Boxes e.g., Giguère, [52]

* Darker shading indicates increasing levels of activation and collaboration.

FACTS ABOUT ROTATOR CUFF DISORDERS

Fact #1
The long term outcome is the same with or without surgery for most people with rotator cuff disorder.

Fact #2
The amount of pathology identified on MRI or x-ray is not always linked to whether you will improve with surgery or exercise.

Fact #3
Exercise is one of the most effective treatments for rotator cuff disorders and to improve people will have to exercise their shoulder whether they receive surgery or not

Fact #4
A person's expectations can influence recovery from rotator cuff disorder.

Open access Original article

BMJ Open Sport & Exercise Medicine

Concurrent validity of a patient self-administered examination and a clinical examination for femoroacetabular impingement syndrome

Kwadwo Adu Owusu-Akyaw ¹, Carolyn A Hutyrá ¹, Richard J Evanson, ²
Chad E Cook ³, Mike Reiman, ³ Richard C Mather ⁴

Diagnostic Accuracy

Exam Type	Percentage
Standardised Clinical Exam	~45%
Self-Administered Exam	~53%

Table 4. Comparative Analysis of Diagnostic Accuracy with 50 patients for rotator cuff tears

The tests	Clinical Values of Diagnostic Accuracy (% correct)	Telehealth Values of Diagnostic Accuracy (% correct)
ER Lag sign	28	30
Painful Arc test	62	62
Shoulder Shrug	44	48
Drop Arm test	38	33
Belly Press test	34	46
Lift off sign	26	54
Hawkins Kennedy test	58	56
Neer's Sign	56	66
Night Pain	58	62
ER pain with Strength Testing	50	50
IR pain with strength Testing	32	42
Abduction pain with strength testing	48	46
ER weakness with strength testing	52	30
IR weakness with strength testing	38	38
Abduction weakness with strength testing	62	40
IR limitation	58	34
Active to Passive Flexion limitation	36	32
ER affected to contralateral limitation	40	54
(Mean Diagnostic Accuracy)	45.53%	45.72%

ER=External rotation; IR=Internal Rotation; p value =0.98 (no significant difference)



In the Hopper

- Decision making flow for Spine related Problems
- Decision making flow for Shoulder Problems

Thank You