Technology-Assisted Interventions for Chronic Pain: Research and Practice

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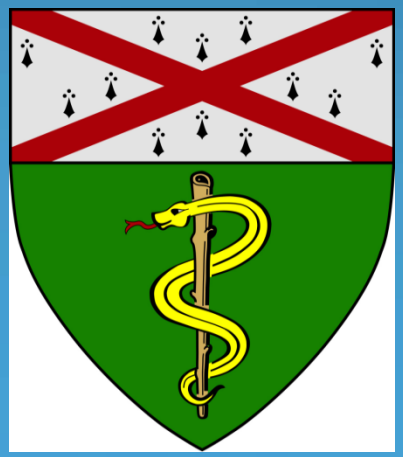

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Abbreviations and Terms Used in This Presentation

- CBT= Cognitive Behavioral Therapy
- IVR= Interactive Voice Response
- F:F= Face to Face
- cLBP= Chronic Low Back Pain
- Technology-assisted intervention – a treatment that is wholly or partially provided via technology

Objectives

- Provide an overview of reasons for using technology-assisted pain self-management interventions
- Discuss considerations for developing a technology-assisted intervention
- Use the CO-operative Pain Education and Self-management (COPES) trial as an example
  - Ways challenges of technology-assisted interventions were addressed
  - Lessons learned

Background

- Chronic pain affects approximately 100 million adults in US [1]
- IOM Report[1] called for a "cultural transformation"
  - Promoting and enabling self-management for all persons with pain
  - Encouraging strategies for reducing barriers to care
- Among Veterans receiving care in VHA, pain is
  - Common[2,3]
  - Costly[4]
  - Associated with negative outcomes[2,5,6]

Benefits of technology-assisted treatments

- Improved access to treatment
  - Avoids schedule and travel barriers
  - Treatment and provider availability
- Reduced stigma
- Prospective data collection
- Maintenance

Using Technology to Deliver Pain Self-Management

- Treatments produced positive results[7-9]
- Do not know if technology-assisted treatments are as effective as similar face to face treatments
- No evidence for one modality over another
- Treatment retention and outcomes may be improved with contact[10]
- Little guidance on treatment and material development

Challenges of technology-assisted treatments

- Produce understandable materials
- Promotion of engagement and retention
- Promotion of practice and use of skills
- Maintaining patient safety

IVR Treatment Outline

- Learn coping skills- handbook
- Assigned goals to practice the skills daily
- Report how they are doing on a daily automated IVR call
- Receive pre-recorded therapist feedback

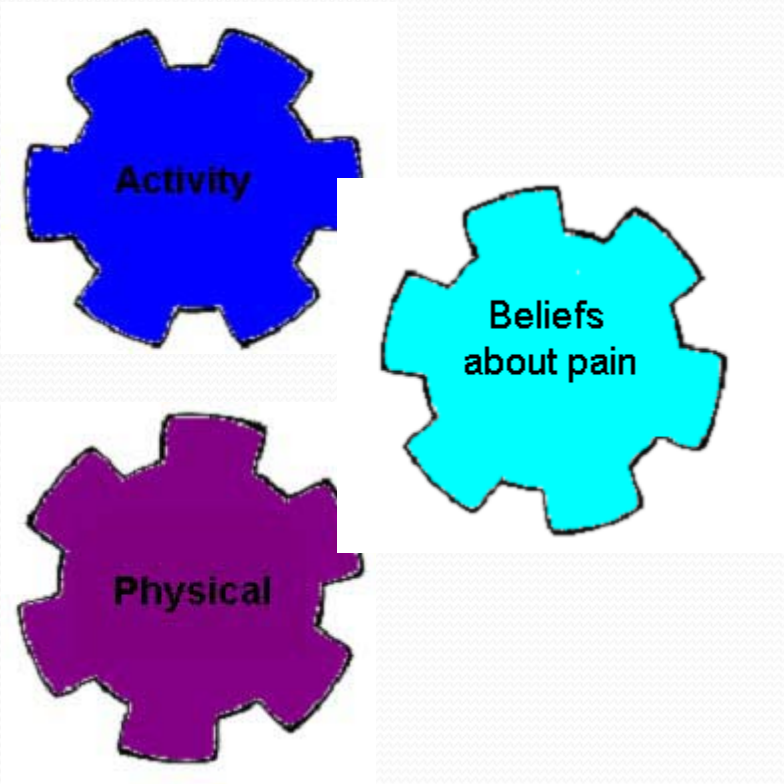
Understandable Materials

- Considerations
  - Materials must present treatment rationale and information
- Choices
  - Created by group of subject matter experts
  - Based on materials used in prior trials of CBT
  - Written at 6-7th grade reading level
  - Brief IVR scripts offer a second way to obtain information
  - T/F questions

Pain Cycle

Beliefs about Pain
Thoughts
Activity
PAIN
Social Life
Physical
Mood

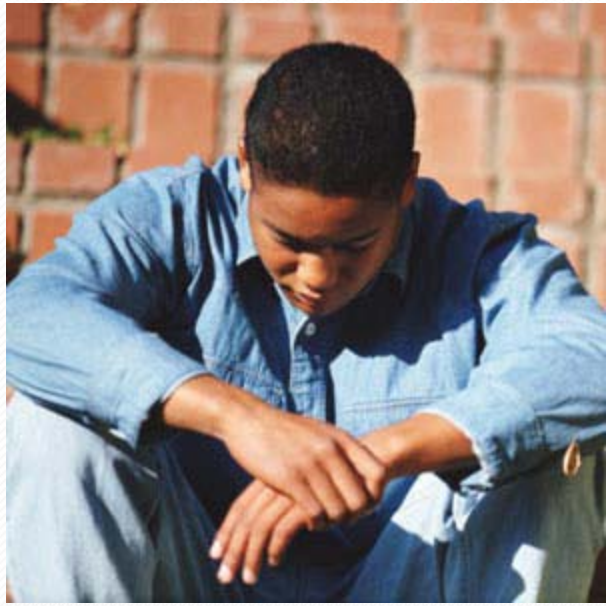
Pain Cycle - Stretching



Skill: STRETCHING

Stretching will directly affect your activity level and your physical functioning over time. As you practice stretching you will notice that it does not cause harm and this may change your beliefs about pain.

Handbook Pictures



Rejected handbook pictures

Promote Skill Use and Practice

- Considerations
  - Common in CBT to use goals for practicing skills
  - Limited experience with goal setting
  - Little opportunity for corrective feedback
- Choices
  - Assign skill practice goals
  - Reviewed prior trial to identify most popular goals
  - Daily IVR call to report practice

Engagement and Retention

- Consideration
  - How do we enhance engagement in a treatment that could seem impersonal
- Choices
  - Therapist and staff pictures in the handbook
  - Peer testimonials
  - Personalized therapist feedback
  - Free choice goal
  - Option to leave message for therapist

IVR Feedback Example

- Hi X. Congratulations on completing week 2. I see you answered your calls every day, excellent job.
- Your average pain score this week is a 4.5, the lowest it has been yet. I also noticed that on Thursday and Saturday your pain was at a 2. Was there anything different you did on those days that could have made a difference? It is so helpful to look for patterns or relationships to an increase or decrease in pain. We will keep watching.
- Feedback is given for each of the six daily questions

Maintain Safety

- Consideration
  - How to replicate safety monitoring that occurs in F:F treatment?
- Choices
  - Automatic connection to Veteran Crisis Line
  - Weekly proactive activity-related adverse event assessment

Pilot testing

- Veterans with chronic pain (n=17)reviewed treatment materials completed a semi-structured interview

Characteristic	Mean/%
Age	55 (SD=8.3)
Sex (% male)	94%
Race/ethnicity	
Black	29.4%
Hispanic	5.9%
White	64.7%
Global pain intensity rating	6.4 (SD=1.8)
Pain duration	18.29 years (SD=11.4)

Pilot Testing Continued

- Treatment preference
  - IVR=58%
  - F:F=24%
  - No preference=18%
- Most common reason to prefer IVR was travel
- Understandability: 93% of participants (13 of 14) answered 80% or more of the T/F questions correctly
- Majority indicated understanding of skills and rationale for use

Revisions Based on Participant Feedback

- Word choices
- Clarification
  - Directions
  - Catastrophizing/reframing
- Length
- Visuals

Co-operative Pain Education and Self-Management: COPES

- Randomized non-inferiority trial of IVR-based CBT versus F:F CBT for chronic low back pain (cLBP)
- Innovations
  - First trial to use IVR only to deliver self-management treatment for chronic pain.
  - Compares a technology-assisted intervention to face to face treatment

Study Hypotheses

- Veterans with cLBP receiving IVR-CBT will demonstrate outcomes that are not unacceptably worse than F:F CBT in
  - Pain intensity (Primary)
  - Physical and emotional functioning and health-related quality of life (Secondary)
  - Treatment dropout rates, skill practice, call adherence, and treatment satisfaction ratings
- Examine moderators of treatment outcomes

Eligibility Criteria

- Diagnosis of low back pain
- Pain rating ≥ 4 and presence of pain for ≥ 3 months,
- No medical or psychiatric condition that would impede participation
- Self-reported ability to walk at least one block
- Touchtone telephone
- No sensory deficits that would impair participation
- No surgical interventions for pain during trial

Methods

- VA Connecticut Healthcare System
- Recruitment – opt out letter and in hospital
- Randomization (1:1)
  - Permuted stratified block design with varying block size
    - Distance
    - Pain type
- Treatment fidelity evaluated
- Participants paid for pre-post assessments, not calls

General Treatment Structure

- Ten-week treatment
- Introduction, eight pain coping skills, and pain flare prevention
- Pedometer facilitated walking component
- Weekly treatment goals
  - Practice pain management skill
  - Increase steps +10% over prior week's average
  - Planned productive, social, or pleasant activity
- Daily IVR call
- Weekly feedback

Treatment Differences

F:F

- Therapist teaches skills
- Free choice goal developed with therapist
- Therapist feedback delivered in session
- No extra IVR features available

IVR

- Handbook/IVR teaches skills
- Free choice goal developed independently
- Pre-recorded personalized therapist feedback via IVR
- Extra IVR system features
  - Messages
  - Peer testimonials, tips and explanation of skills
  - Veteran Helpline

Automated IVR Calls

Daily

- Average pain intensity for that day (NRS)
- Skill practice rating (0-10)
- Sleep duration
- Sleep quality
- Activity (steps)
- Catastrophizing (2)

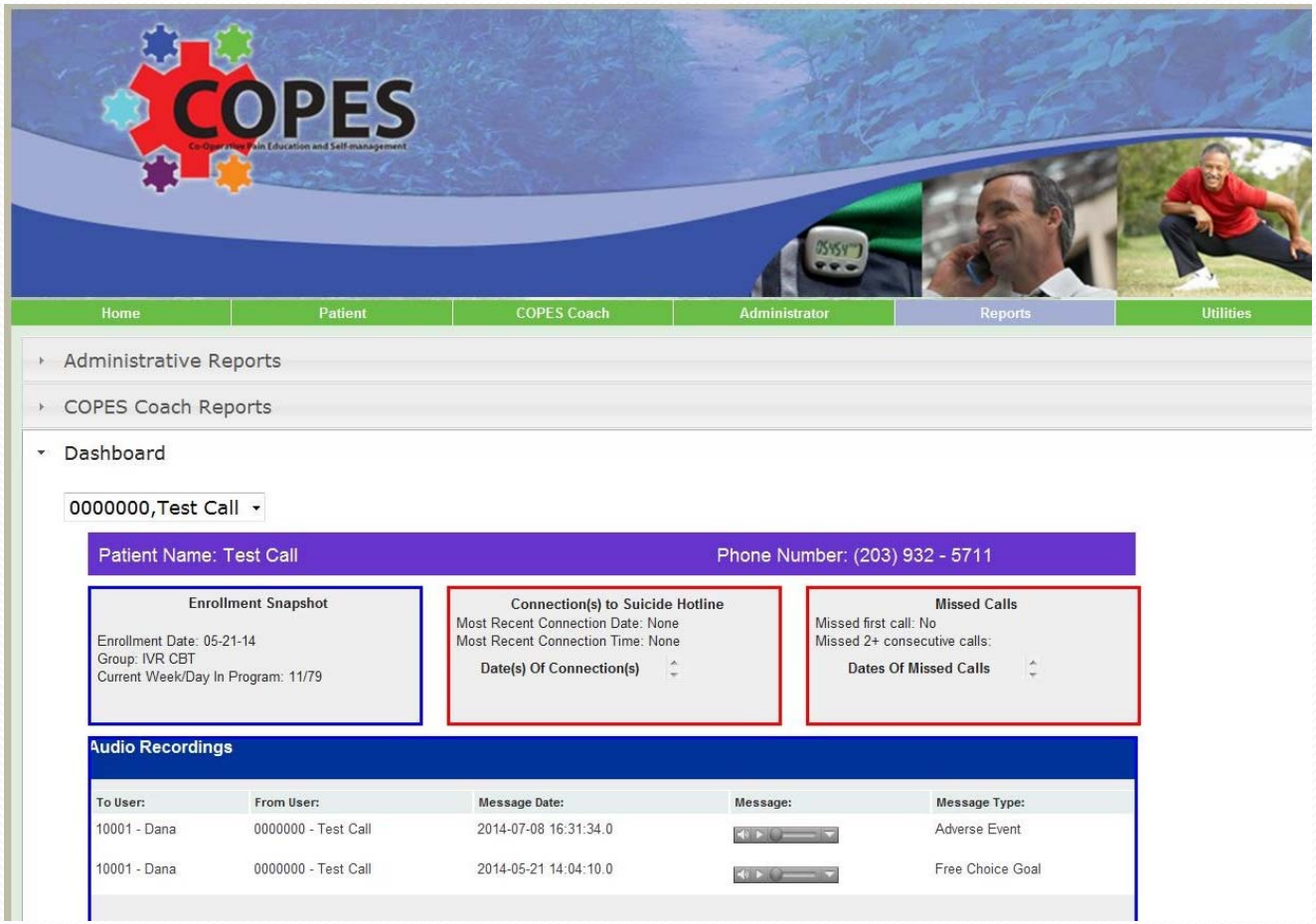
Weekly

- Proactive assessment of activity-related AEs
- Medication changes
- Free choice goal and rating

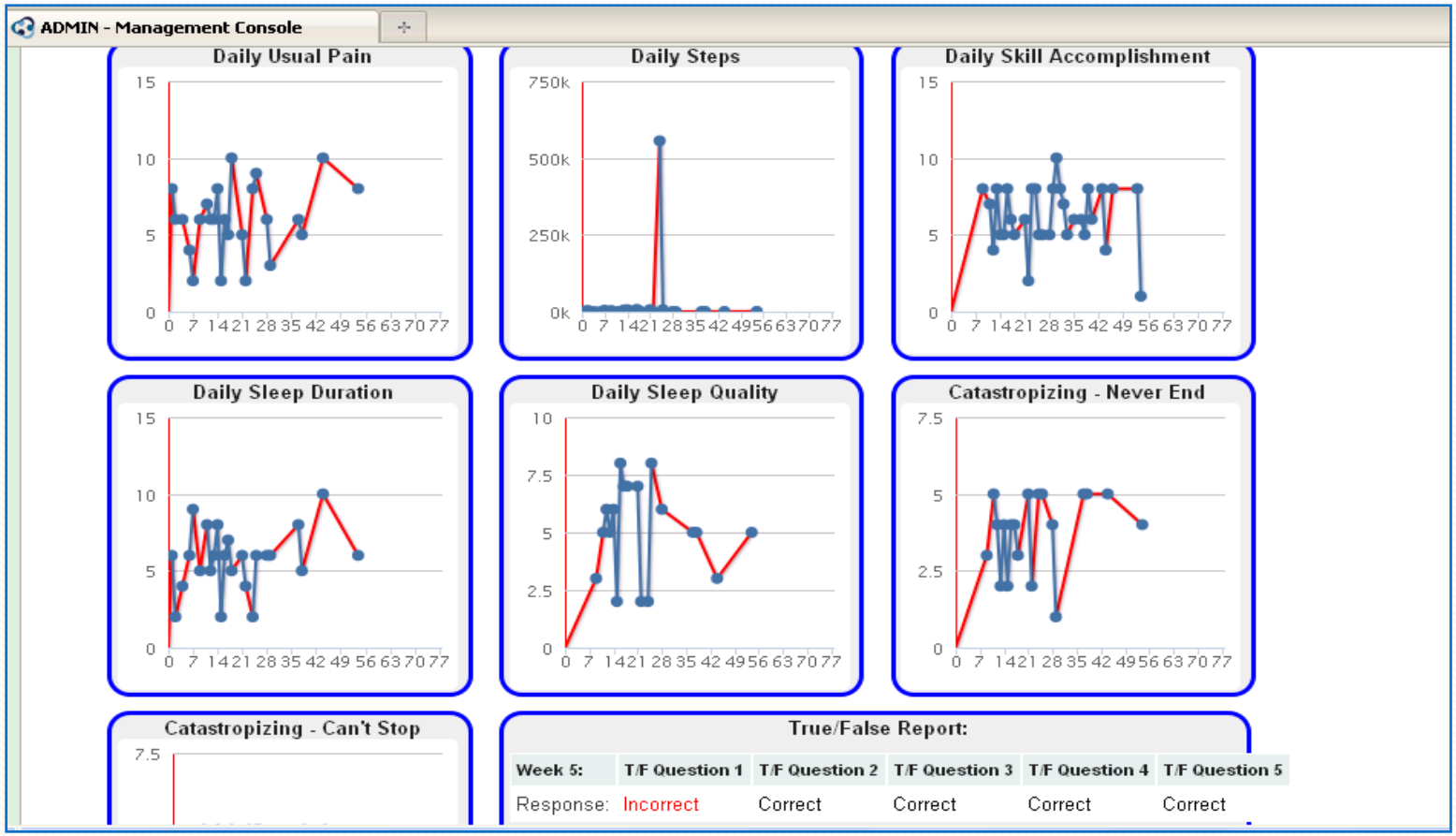
IVR System

- Generates daily call at a predetermined time
- Up to 3 chances to complete call/day
- Daily update to PI, staff, and therapists
- PI monitors the system

Participant Overview



IVR Report Summary



Weekly IVR Summary

Home | Patient | COPES Coach | Administrator | Reports | Utilities

Administrative Reports

COPES Coach Reports

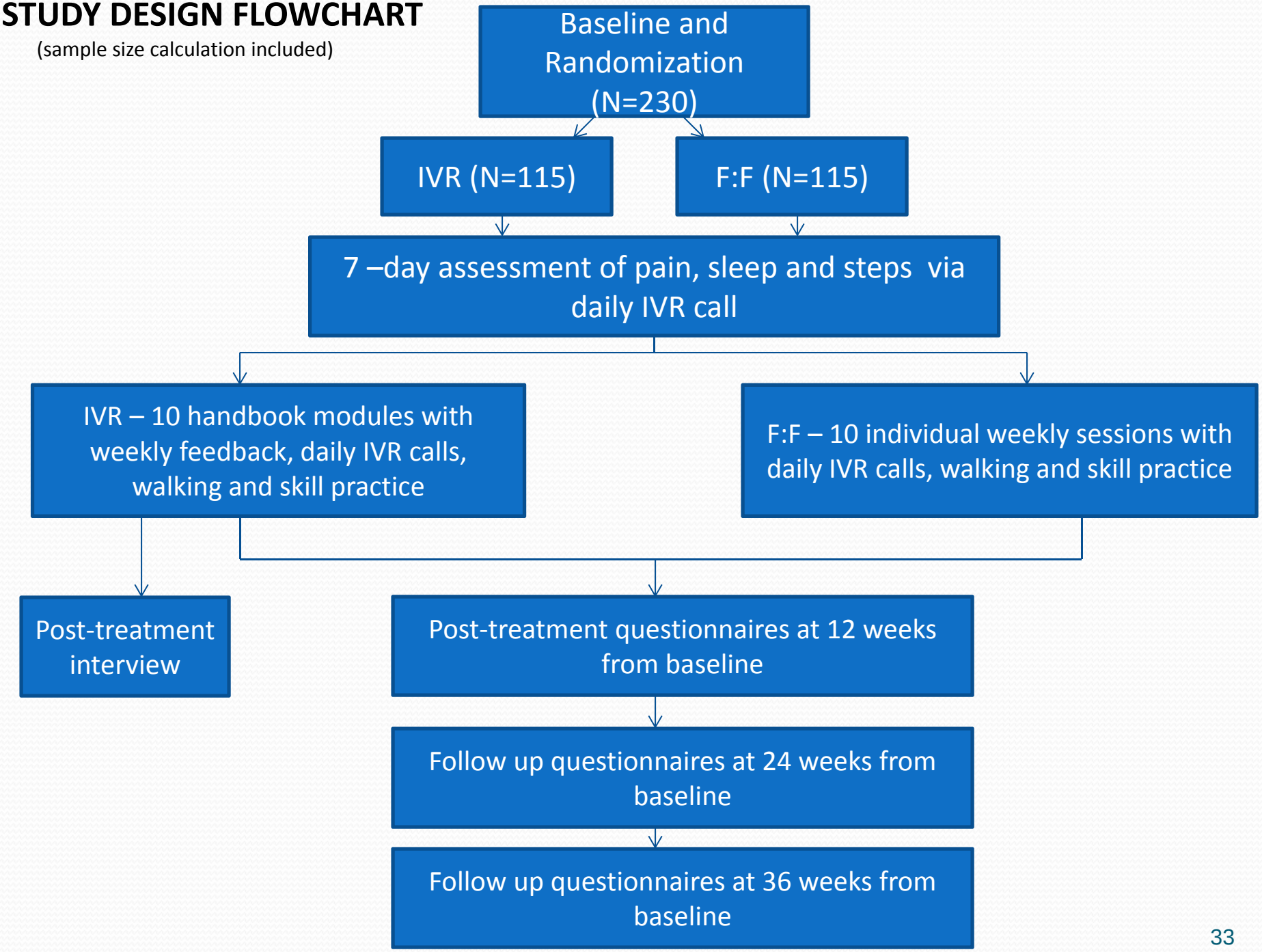
Patient Call Report | Graphs & Charts | Tabular Reports | Audio Clips

0000000,Test Call

WEEKLY - Week 10	Day 1 Wed 05/21	Day 2 Wed 05/21	Day 3 Wed 05/21	
Pain Usual	7.00	6.00	7.00	8.00
Skill Accomplishment	2	6	7	9
Steps	4578.00	5782.00	5002.00	4068.00
Sleep Duration	8.00	8.00	8.00	7.00
Sleep Quality	7.00	9.00	9.00	6.00
Catastrophizing - Never ...	1	1	1	1
Catastrophizing - Can't st...	1	1	1	1
Connected To Hotline	No	No	No	No

STUDY DESIGN FLOWCHART

(sample size calculation included)

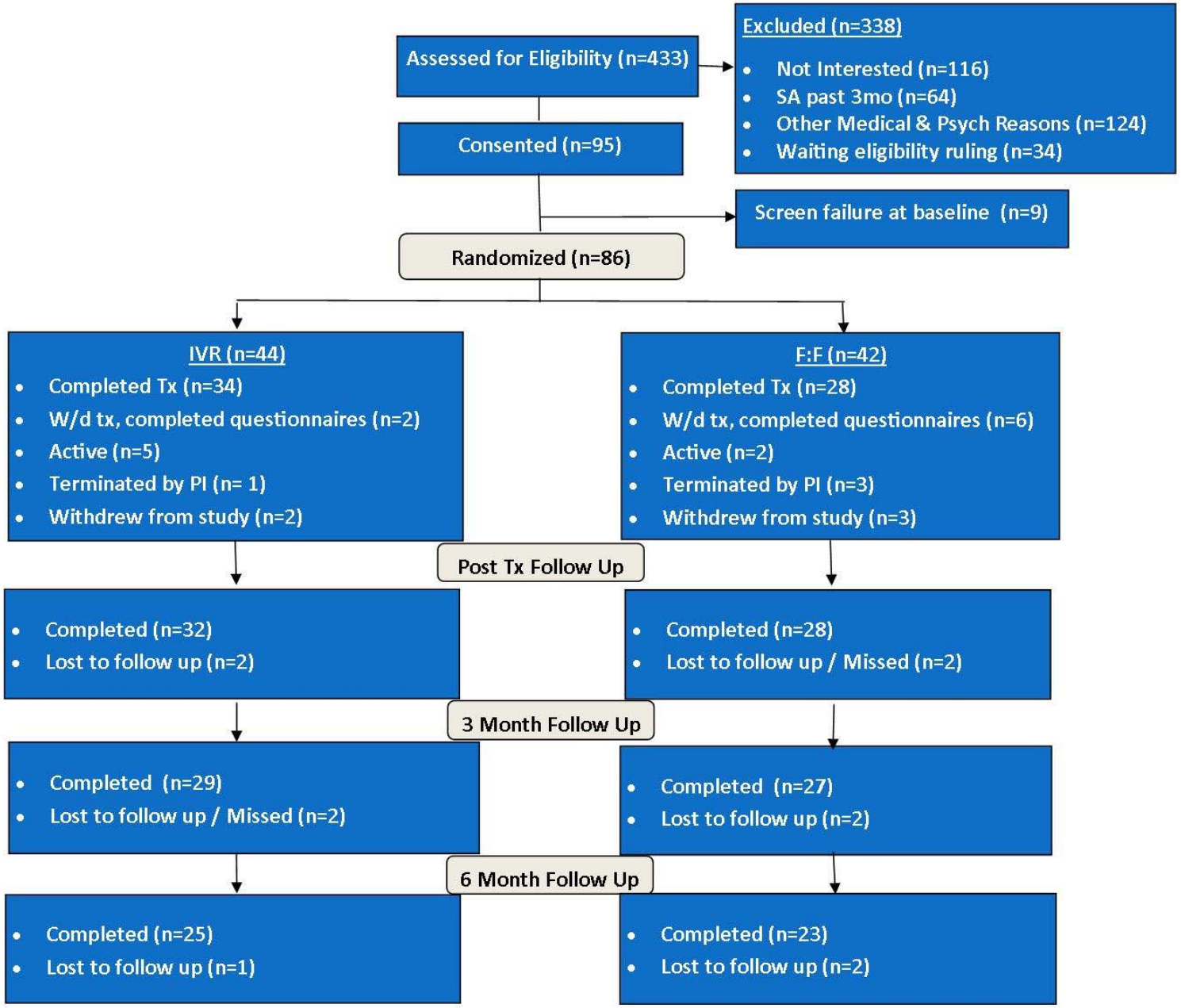


Outcomes

Variable	Measure	Collection method
Pain intensity (primary)	NRS[11] – Average pain (0 = no pain, 10 = worst pain imaginable)	IVR daily calls Pre-post/Web
Physical functioning	MPI[12] –Interference Steps	Pre-post/Web IVR daily calls
Emotional functioning	Beck Depression Inventory[13]	Pre-post/Web
Overall health/health-related quality of life	SF-36V[14]	Pre-post/Web
Skill practice	How well did you accomplish skill practice goal today? (0=not at all, 10=completely)	IVR daily calls

Data Analytic Plan

- IVR-CBT not unacceptably worse than F:F CBT
  - Non-inferiority margin of 1 point on the 0-10 NRS
  - Clinically meaningful difference is a 2 points or ≥30% decrease.[13]
  - Compare IVR-CBT to F:F CBT on NRS pain intensity ratings at 12 weeks
- Responder analysis – to identify the % of participants in each intervention who obtained meaningful benefit.
  - Responder = ≥30% mean decrease in average pain[15]



* Participants who have not yet reached each follow-up stage are not represented

Randomized Participants

Characteristic	F2F (n=38)	IVR (n=37)	Total (n=75)
Age, M (SD)	56.7 (11.1)	59.7 (12.0)	58.2 (11.6)
Sex , N (%male)	33 (86.8)	32 (86.5)	65 (86.7)
Race/Ethnicity, N(%)			
American Indian or Alaskan native	0 (0.0)	1 (2.7)	1 (1.3)
Asian/Pacific Islander	1 (2.6)	0 (0.0)	1 (1.3)
Black	10 (26.3)	8 (21.6)	18 (24.0)
Hispanic	4 (10.5)	2 (5.4)	6 (8.0)
White	22 (57.9)	26 (70.3)	48 (64.0)
Unanswered	1 (2.6)	0 (0.0)	1 (1.3)
Pain Intensity, M (SD)	6.5 (1.8)	6.3 (1.5)	6.4 (1.7)

Poll #1

- Which of the following concerns about the treatments turned out to be true?

  1. Participants do not adhere to IVR daily call schedule
  2. IVR-CBT participants have difficulty setting free choice goals.
  3. Participants lose or do not use pedometers
  4. IVR-CBT participants drop out
  5. IVR-CBT participants leave many messages for their therapists

Preliminary Findings

- Ongoing trial in no cost extension
  - Power > .90 to detect effect with 100 treatment completers
- Preliminary feasibility analysis

	IVR	F:F
Attrition Rate, N (%)	6 (16.2)	11 (28.9)
Skill Practice (self report), M (SD)	7.48 (1.19)	6.64 (1.93)
Treatment Weeks, M (SD)	9.01 (2.71)	6.79 (3.94)

IVR Call Completion Rates

Study Condition	N*	Mean (SD) %
F:F	39	80.0 (29.5)
IVR	36	89.3 (14.9)
Total	75	84.5 (24.0)

*includes completed, withdrawn, and active callers

Steps

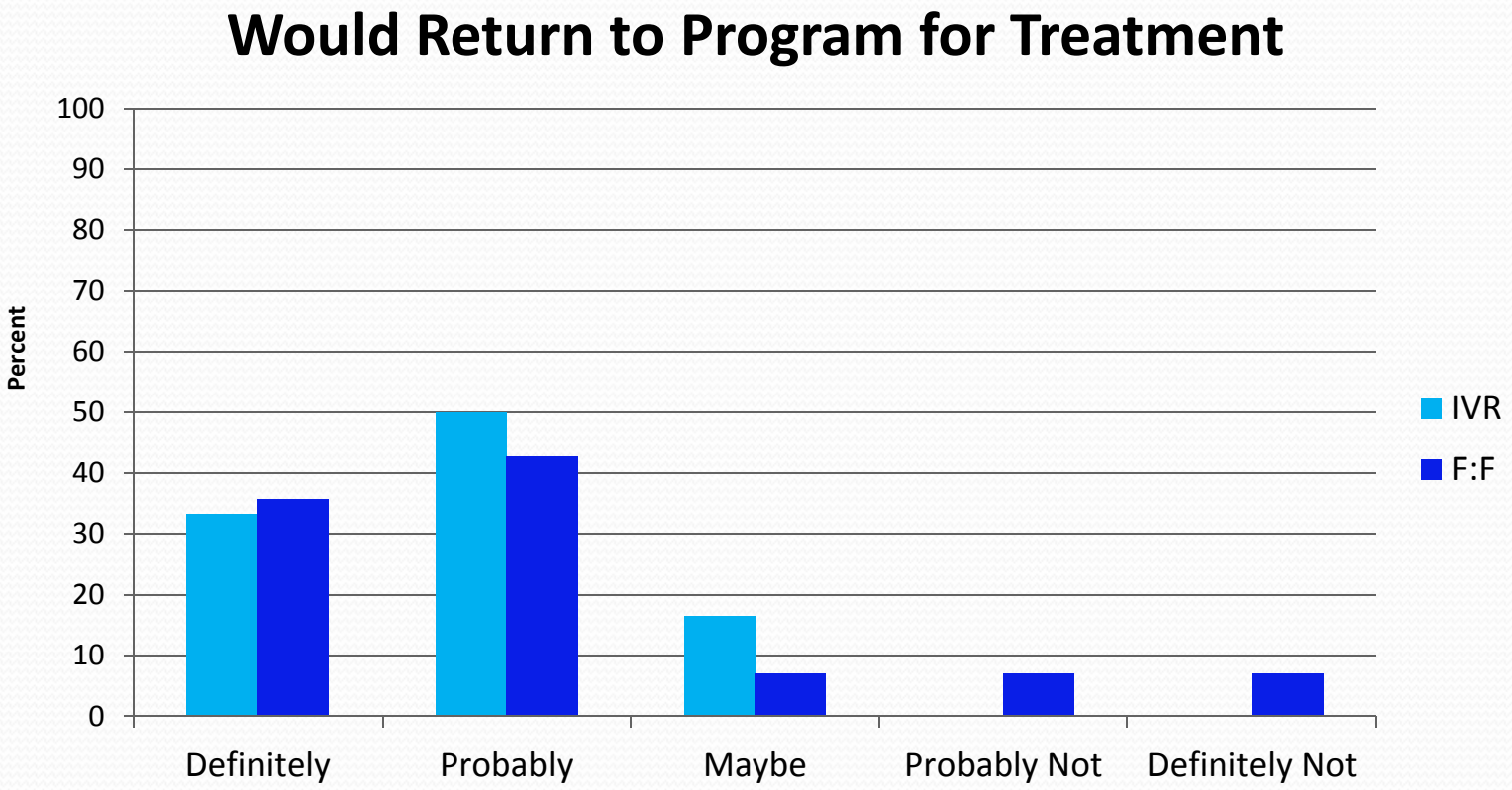
- Participants in both conditions achieved a significant increase in the mean number of steps taken relative to baseline
- The increase was comparable to stand alone walking interventions for individuals with musculoskeletal disorders

Condition	IVR	F2F
Baseline	3844	3688
Post-treatment	6505	5177
Increase	2661	1488

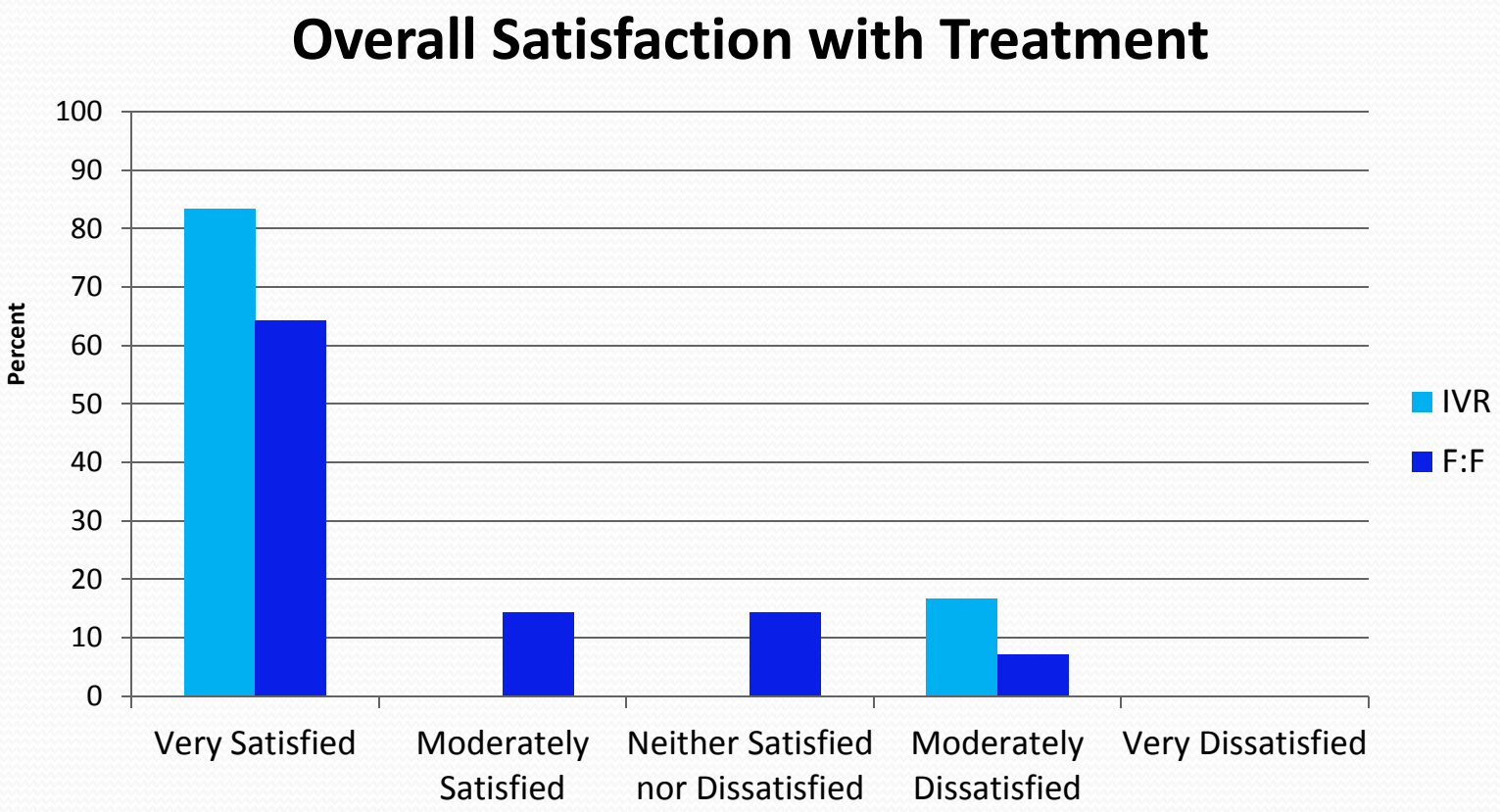
IVR Post-Treatment Interview

- Semi-structured interview (n = 25)
- Helpfulness of treatment components on a 0-10 scale
  - Handbook (m=9.05, rage 5-10)
  - IVR calls (m = 9.59, range 8-10)
- Greater variability in other treatment component ratings
  - Favorite and least favorite skills
  - Coach feedback
  - Use of extra IVR system features
- Difficulty with the free choice goal

COPES Feasibility-Return for Treatment



COPES Feasibility-Treatment Satisfaction



Conclusions

- IVR-CBT appears to be a feasible method for engaging patients in CBT for cLBP
- IVR-CBT participants
  - engaged in the intervention as actively as F:F participants
  - Increased their daily steps
  - treatment satisfaction comparable to F:F participants
- Limitations
  - Preliminary nature of the data
  - Have not examined clinical outcomes

Suggestions for Using an IVR System to Provide Treatment

- Preliminary testing of system
- Daily status report
  - Calls sent
  - Missed calls
  - Alerts and AEs
  - Steps=0
- Examine data early

Lessons Learned

- Avoid complexity
  - Independent goal setting
  - Call pausing
- Eliminate patient barriers
  - Minutes
  - In-person visits

Contact Information

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