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Enhanced Medical Rehabilitation increases therapy intensity and engagement and improves functional outcomes in post-acute rehabilitation of older adults: a randomized controlled trial

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Abstract

Objectives—For millions of disabled older adults each year, post-acute care in skilled nursing facilities (SNFs) is a brief window of opportunity to regain enough function to return home and live independently. Too often this goal is not achieved, possibly due to therapy that is inadequately intense or engaging. This study tested Enhanced Medical Rehabilitation, an intervention designed to increase patient engagement in, and intensity of, daily physical and occupational therapy sessions in post-acute care rehabilitation.

Design—Randomized controlled trial of Enhanced Medical Rehabilitation versus standard-of-care rehabilitation.

Setting—Post-acute care unit of a skilled nursing facility in St Louis, MO.

Participants—26 older adults admitted from a hospital for post-acute rehabilitation.

Intervention—Based on models of motivation and behavior change, Enhanced Medical Rehabilitation is a set of behavioral skills for physical and occupational therapists (PT/OT) that increase patient engagement and intensity, with the goal of improving functional outcome, through: (1) a patient-directed, interactive approach, (2) increased rehabilitation intensity, and (3) frequent feedback to patients on their effort and progress.

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Measurements—Therapy intensity: assessment of patient active time in therapy sessions. Therapy engagement: Rehabilitation Participation Scale. Functional and performance outcomes: Barthel Index, gait speed, and six-minute walk.

Results—Participants randomized to Enhanced Medical Rehabilitation had higher intensity therapy and were more engaged in their rehabilitation sessions; they had more improvement in gait speed (improving from 0.08 to 0.38 meter/sec vs. 0.08 to 0.22 in standard of care,p=0.003) and six-minute walk (from 73 to 266 feet vs. 40 to 94 feet in standard of care, p=0.026), with a trend for better improvement of Barthel Index (+43 points vs. 26 points in standard of care, p=0.087), compared to participants randomized to standard-of-care rehabilitation.

Conclusion—Higher intensity and patient engagement in the post-acute rehabilitation setting is achievable, with resultant better functional outcomes for older adults. Findings should be confirmed in a larger randomized controlled trial.

Introduction

Older adults are frequently admitted to skilled nursing facilities (SNFs) after medical events such as heart attack and hip fracture that leave them severely disabled.[1,2] These individuals receive post-acute rehabilitation using daily physical therapy (PT) and occupational therapy (OT). The use of SNFs in geriatric post-acute rehabilitation is increasing, because of the aging of the population and increasing numbers of older adults surviving acute medical events.[2]

High-intensity therapeutic exercises in post-acute rehabilitation and in the long term appear to improve functional outcome of older adults who have had disabling medical events such as hip fracture and stroke.[3-7] Yet, post-acute PT/OT is often low in intensity. This observation may seem counterintuitive, as SNF rehabilitation involves up to two hours of daily contact. Yet actual PT and OT time are typically less than that; usually between 30 min and 45 min of PT contact and between 15 and 30 min of OT contact daily.[8] Scheduled therapy time may greatly overestimate actual active time during sessions, as studies using actigraphy or observers counting repetitions have found quite low intensity in a variety of post-acute settings.[9,10] It is posited that two main factors account for this low intensity of post-acute therapy: (1) The PT and OT often does not strive for high intensity.[9] (2) The interaction with patients can be unengaging for patients because therapists do not explicitly use principles of engagement, such as patient-directed therapy and frequent feedback.[11,12]

These shortcomings should be remediable by applying theories of behavior change to better motivate patients. Theories of behavior change including social cognitive theory[13] and self-regulatory theory[14] have applications in patient engagement[11,12] such as the Health Action Process Approach[15] and motivational interviewing.[16] We hypothesized that such theories regarding behavior change could be made applicable to the SNF rehabilitation setting by teaching therapists tools to engage their patients and get them to perform high-intensity therapy. Therefore, our group developed *Enhanced Medical Rehabilitation* (EMR): PT and OT which focuses on engaging patients in their therapy sessions by adopting a patient-directed approach and increasing the intensity of therapy. A case series found that older adults receiving EMR had excellent functional outcomes.[17] This paper reports the results of a randomized controlled trial of EMR vs. standard-of-care rehabilitation in older adults receiving post-acute rehabilitation in a SNF. The hypotheses were that participants randomized to receive EMR would participate in therapy sessions with higher intensity and engagement, and would have more functional improvement during their SNF rehabilitation stay, compared to those randomized to standard-of-care therapy.

Methods

Sample

From July 2010-October 2011, patients aged 60 and older were recruited upon admission to three units of a skilled nursing facility (SNF) in St. Louis, Missouri for post-acute rehabilitation after a disabling medical event. Patients with all impairments were included (e.g., not solely hip fracture), in part because it was expected that patients' reasons for admission would be varied and multiple and we hypothesized that Enhanced Medical Rehabilitation would be applicable to all of these conditions, and in part because this broader inclusion strategy is recommended by others in rehabilitation research.[18] Exclusion criteria were: unable to provide informed consent (defined by a Short Blessed Test[19] score >10 plus inability to show understanding of the consent process, or known diagnosis of dementia), lifetime psychotic disorder, active substance abuse, recommended for hospice care, or metastatic cancer. Potential participants were screened by the study team and upon providing university-approved written informed consent, initiated in the study. Eligible participants were randomized to EMR or standard-of-care therapy.

Intervention

EMR is a "how" intervention, not a "what" intervention; in detail, EMR is a set of behavioral skills for therapists to integrate into their OT/PT practice to increase the intensity of, and the patient's engagement in, all therapeutic sessions. It has three foci: an interactive patient-directed approach, increased intensity, and frequent feedback to patients on their effort and progress. These foci stem from theories of behavior change, including social cognitive theory[13] and self-regulatory theory,[14] and their applications to patient engagement [11] such as the Health Action Process Approach[15] and motivational interviewing.[16] The treatment manual is available from the first author. EMR's three foci are described in Table 1, with examples.

EMR was developed for real-world rehabilitation and thus must be done while the therapists are conducting their PT or OT, with frail and deconditioned individuals, in a hectic SNF environment. As a result, EMR is parsimonious and, after sufficient practice, can be carried out automatically. Training and supervision methods were developed to promote a high level of therapist adherence and competence with EMR.[20] These methods included: a) providing and reviewing together the study manual and also a one-page checklist version of the manual for daily reminder; b) weekly 30-minute supervision meetings which included collaborative review of videotapes of therapy sessions, and; c) one-on-one observation and feedback after each therapy session.[20] One of the SNF's three rehabilitation teams was selected at random to be the EMR team; they consisted of four therapists (one occupational therapist and one occupational therapy assistant, one physical therapist and one physical therapy assistant). They ranged from 29-45 years of age and 5-25 years of experience. They were trained and supervised in EMR by doctoral-level faculty in occupational and physical therapy (MWH and HHH). The standard-of-care (SOC) group received typical, normative therapy from PT/OTs (or assistants) who were not trained nor supervised in EMR.

Details of the training, supervision, and treatment fidelity monitoring techniques are published elsewhere.[20] In summary, the four therapists carried out EMR techniques with a high degree of treatment fidelity, easily differentiated from SOC sessions. In terms of adherence to EMR principles, for example, "patient decided which goals to work on" was done an average of two times per EMR session, vs 0 times per SOC session; "patient decided which activities to perform" 2.4 vs. 0.3; "therapist clarified relationship of therapy activities with patient goals" 2.2 vs. 0.5; "therapist asked patient's effort level" 5.6 vs. 0.1; "therapist asked for patient's feedback" 4.7 vs. 1.0; and "therapist related progress in

therapy activities to progress towards patient goals" 1.1 vs. 0 ($p<0.001$ for all comparisons between EMR and SOC, t-tests ranged 3.8-13.2). Competence ratings (on a 1-3 scale for each of the three foci of EMR, where 1: poor, 2: fair, 3: excellent) were similar: for "high intensity", EMR therapist competence was 2.6 vs. 1.5 for SOC; for "interactive patient-directed approach, it was 2.7 vs. 1.0; and for "feedback on effort and progress" it was 2.6 vs. 1.1 (all p's <0.001). All adherence and competence ratings were made in a random subsample of 20% of EMR and SOC sessions by external raters (study investigators and staff).

Process measurement—Rehabilitation Intensity was measured by a rating of Patient Active Time; i.e., the amount of time during a PT/OT session in which patients were observed actively doing a therapeutic activity (e.g., walking or practicing an Activity of Daily Living) as opposed to sitting and doing nothing (resting or listening). A random sample of 20% of EMR and SOC sessions (105 sessions) were rated by a member of the research team for Patient Active Time per session. Interrater reliability of this rating is excellent (ICC >0.9 for both PT and OT) and it is highly correlated with an objective actigraphy count for the same sessions.[21] It is acknowledged that active time is only one measure of intensity; amount of effort could not be measured in both the EMR and SOC groups because its measurement was a component of the "feedback on effort" component of EMR.

Treatment engagement was measured via the therapist-rated Rehabilitation Participation Scale[22] in each therapy session (890 total). In this 1-6 scale, a score of 5-6 demonstrates active engagement in the therapy session,[23] i.e., patient showed interest in and intentional effort to work towards rehabilitation goals.

Therapist-patient relationship was measured with the patient-reported Working Alliance Inventory[24] (WAI). The WAI examines non-specific therapist variables and is a technique-independent predictor of positive treatment outcomes (in psychotherapy research).

Outcomes: The Barthel Index is a 0-100 scale[25] that measures ability to perform 10 basic Activities of Daily Living or mobility items. It has excellent external validity in predicting independent living.[26,27] Performance-based measures of physical function also have strong external validity in predicting clinical outcomes such as hospitalization and mortality. [28-30] Therefore gait speed (time to walk 6 meters, in meters/second) and 6 minute walk (number of feet walked in 6 minutes) were measured using methods described in the Nursing Home Physical Performance Test.[31] All outcomes were assessed by raters blinded to intervention group.

Statistical analysis

SAS 9.2 was used for all analyses. Examination of the process differences between EMR and standard-of-care was a comparison of average engagement and intensity scores between groups using t-tests. To examine outcome changes between the two treatment groups, ANCOVA of the change scores for outcome measures from admit to discharge, controlling for admit scores, was used as recommended for RCTs of pre-post effects.[32] These outcome findings were retested using mixed effect models; findings and significance were essentially unchanged.

Results

Four hundred sixty-nine patients were screened for study eligibility from July 2010-October 2011: four patients refused to participate, 439 were either ineligible (chiefly for cognitive impairment or lack of depressive symptoms because of initially tight exclusion criteria

which were loosened) or were not randomized because the study was not actively recruiting at the time, and 26 were randomized. The sample was 74% female and ethnically diverse: 48% Caucasian, 48% African-American, 4% Asian. As Table 2 shows, the two groups did not differ significantly in any variable except medical burden (higher in EMR group). Main reasons for admission were as follows: in the EMR group, deconditioning due to cardiopulmonary problems (n=8), stroke (n=2), hip fracture (n=3), post cervical spine fusion (n=1). In the SOC group, deconditioning due to cardiopulmonary problems (n=6), stroke (n=3), post colectomy (n=1), post repair of tibial fracture (n=2). At baseline, in the EMR group 8/14 were unable to walk (of which 1 was paraplegic), while 6 were able to walk with a wheeled walker; in the SOC group 8/12 were unable to walk, 3 could walk with a wheeled walker and 1 with a cane. Of these 26 participants, one was withdrawn prior to completing their post-acute rehabilitation because their SNF stay was interrupted by a lengthy rehospitalization for Guillain-Barré syndrome. Pre-post data are available for the other 25 subjects.

Intensity

The EMR sessions were greater in Patient Active Time than SOC sessions: mean ±SD=47.2±14.5 minutes for EMR vs. 21.5±10.6 minutes for standard-of-care ($t=7.5$, $p<.0001$, $df=56$).

Engagement

Rehabilitation Participation Scale scores in EMR sessions (N=588) were higher than SOC sessions (N=302), indicating more active engagement by patients: mean±SD=4.98±1.30 for EMR vs. 4.08±1.33 for standard-of-care ($t=9.8$, $df=888$, $p<0.001$). In contrast, scores from the WAI are similar in EMR and SOC: mean ±SD=75.9 ±10.0 for EMR vs. 72.7 ±11.9 for SOC (scale ranges 12-84, where higher scores=greater therapeutic alliance).

Thus, these process data indicate that the differences seen with EMR are specifically related to higher therapy intensity and engagement, and not non-specific therapist alliance factors which were high in both groups.

Outcomes

Table 3 shows functional outcomes in the EMR vs. SOC groups. EMR participants had greater improvement during their SNF stay in gait speed ($p=0.003$) and six-minute walk ($p=0.026$) with a trend towards greater improvement in overall function as measured by the Barthel Index ($p=0.087$). Five of 7 (71%) EMR participants unable to walk at baseline (excluding the participant with paraplegia) regained the ability to walk during their SNF stay (with 1 not regaining ability, and one lost to follow-up due to prolonged hospitalization), vs. 2/8 (25%) SOC participants (difference in proportions not significant).

Discussion

Recovery from disablement is a key geriatric health issue but is often hampered by low-intensity, low-engagement post-acute rehabilitation. In this proof-of-concept study, EMR improved intensity and engagement in therapy sessions, compared to standard-of-care rehabilitation. Additionally, EMR participants had better recovery, with significantly greater improvement in gait speed and six-minute walk distance and a trend toward greater improvement in Barthel Index score. EMR's effect size on these outcomes was in the medium-large to very large range, although these estimates must be viewed with caution, given the relatively small sample size.

Many have proposed a greater focus on patient engagement and intensity in medical rehabilitation.[11,23,33] For example, the 2008 Institute of Medicine Report, *Retooling for an Aging America*, recommended models of treatment that make older persons more active partners in their own care.[34] Additionally, Motivational Interviewing, an intervention that aims to increase patient motivation, has been added to occupational therapy training and tested in studies of physical therapy to increase engagement and intensity in rehabilitation of back pain.[35] However, to the author's knowledge, this is the first test of a standardized protocol to improve rehabilitation by changing the way that physical and occupational therapy is practiced in the SNF setting. It is noteworthy that the EMR model does not ask PT or OT to do anything qualitatively different in their practice; it is simply increasing the focus on treatment engagement and intensity with the goal of providing a more potent "dose" of PT/OT. As such, EMR could be applied to any PT or OT practice in any setting.

The key limitation of this study lies in its novelty: because this is the first RCT of EMR, a larger, confirmatory trial is necessary to confirm that EMR is effective for improving functional outcomes of older rehabilitation patients. A second limitation was the exclusion of participants who were too cognitively impaired to provide informed consent; even after loosening exclusion criteria to allow participants with mild degrees of cognitive impairment (short blessed test <12), still we excluded many individuals with higher levels of cognitive impairment who presumably make up an increasing proportion of the geriatric post-acute rehabilitation population.[36] Future research in this area ought to include replications across a wider range of cognitive abilities and determine whether EMR is effective in more severely impaired patients or needs adaptation. Finally, while not strictly speaking a limitation, EMR's effects on rehabilitation outcomes may go beyond increasing engagement and intensity; for example, more frequent feedback on progress and goal attainment may improve patients' self-efficacy and mastery, which could improve motivation or function.

In conclusion, using the EMR model occupational and physical therapists were able to get their patients highly engaged to do high intensity therapy. Data suggest better functional outcomes with EMR, compared to standard-of-care therapy. This suggests promise for using EMR to improve rehabilitation outcome of older adults.

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References

1. Hardy SE, Gill TM. Recovery from disability among community-dwelling older persons. JAMA. Apr 7; 2004 291(13):1596–1602. [PubMed: 15069047]
2. Report to Congress: Medicare Payment Policy. Mar. 2011a medpac.gov/chapters/Mar11_Ch07.pdfDownloaded June 6, 2012
3. Singh NA, Quine S, Clemson LM, et al. Effects of high-intensity progressive resistance training and targeted multidisciplinary treatment of frailty on mortality and nursing home admissions after hip fracture: a randomized controlled trial. Journal of the American Medical Directors Association. Jan; 2012 13(1):24–30. [PubMed: 21944168]
4. Binder EF, Brown M, Sinacore DR, Steger-May K, Yarasheski KE, Schechtman KB. Effects of extended outpatient rehabilitation after hip fracture: a randomized controlled trial. JAMA. Aug 18; 2004 292(7):837–846. [PubMed: 15315998]

5. Kwakkel G, Wagenaar RC, Twisk JW, Lankhorst GJ, Koetsier JC. Intensity of leg and arm training after primary middle-cerebral-artery stroke: a randomised trial. Lancet. Jul 17; 1999 354(9174): 191–196. [PubMed: 10421300]
6. Outermans JC, van Peppen RP, Wittink H, Takken T, Kwakkel G. Effects of a high-intensity task-oriented training on gait performance early after stroke: a pilot study. Clin Rehabil. Nov; 2010 24(11):979–987. [PubMed: 20719820]
7. Jette DU, Warren RL, Wirtalla C. Rehabilitation in skilled nursing facilities: effect of nursing staff level and therapy intensity on outcomes. American journal of physical medicine & rehabilitation. Sep; 2004 83(9):704–712. [PubMed: 15314535]
8. Jette DU, Warren RL, Wirtalla C. The relation between therapy intensity and outcomes of rehabilitation in skilled nursing facilities. Arch Phys Med Rehab. Mar; 2005 86(3):373–379.
9. Talkowski JB, Lenze EJ, Munin MC, Harrison C, Brach JS. Patient participation and physical activity during rehabilitation and future functional outcomes in patients after hip fracture. Arch Phys Med Rehab. Apr; 2009 90(4):618–622.
10. Lang CE, Macdonald JR, Reisman DS, et al. Observation of amounts of movement practice provided during stroke rehabilitation. Arch Phys Med Rehab. Oct; 2009 90(10):1692–1698.
11. Lequerica AH, Kortte K. Therapeutic engagement: a proposed model of engagement in medical rehabilitation. American journal of physical medicine & rehabilitation. May; 2010 89(5):415–422. [PubMed: 20407308]
12. Danzl MM, Etter NM, Andreatta RD, Kitzman PH. Facilitating neurorehabilitation through principles of engagement. J Allied Health. 2012 Spring;41(1):35–41. [PubMed: 22544406]
13. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev. Mar; 1977 84(2):191–215. [PubMed: 847061]
14. Rasmussen HN, Wrosch C, Scheier MF, Carver CS. Self-regulation processes and health: the importance of optimism and goal adjustment. J Pers. Dec; 2006 74(6):1721–1747. [PubMed: 17083664]
15. Schwarzer R. Social-Cognitive Factors in Changing Health-Related Behaviors. Current Directions in Psychological Science. 2001; 10(2):47–51.
16. Miller, WR.; Rollnick, S. Motivational interviewing: Preparing people for change. 2nd ed. Guilford Press; New York: 2002.
17. Lenze EJ, Host HH, Hildebrand M, et al. Enhanced Medical Rehabilitation Is Feasible in a Skilled Nursing Facility: Preliminary Data on a Novel Treatment for Older Adults With Depression. The American journal of geriatric psychiatry. Jul 20.2011
18. Wade DT, Smeets RJ, Verbunt JA. Research in rehabilitation medicine: methodological challenges. Journal of clinical epidemiology. Jul; 2010 63(7):699–704. [PubMed: 19788953]
19. Davis PB, Morris JC, Grant E. Brief screening tests versus clinical staging in senile dementia of the Alzheimer type. Journal of the American Geriatrics Society. Feb; 1990 38(2):129–135. [PubMed: 2299116]
20. Hildebrand MW, Host HH, Binder EF, et al. Measuring Treatment Fidelity in a Rehabilitation Intervention Study. American journal of physical medicine & rehabilitation. epub Feb 28 2012.
21. Hildebrand, M.; Host, HH.; Kraus, L.; Lenze, E.; Binder, EF. Novel methods for increasing and measuring occupational therapy intensity in the skilled nursing rehabilitation setting. Poster presentation at the 2012 AOTA National Conference in Indianapolis, IN; Indianapolis, IN: 2012.
22. Lenze EJ, Munin MC, Quear T, et al. The Pittsburgh Rehabilitation Participation Scale: reliability and validity of a clinician-rated measure of participation in acute rehabilitation. Arch Phys Med Rehabil. Mar; 2004 85(3):380–384. [PubMed: 15031821]
23. Kortte KB, Falk LD, Castillo RC, Johnson-Greene D, Wegener ST. The Hopkins Rehabilitation Engagement Rating Scale: development and psychometric properties. Arch Phys Med Rehabil. Jul; 2007 88(7):877–884. [PubMed: 17601468]
24. Horvath AO, Greenberg LS. Development and Validation of the Working Alliance Inventory. J Couns Psychol. Apr; 1989 36(2):223–233.
25. Granger CV, Dewis LS, Peters NC, Sherwood CC, Barrett JE. Stroke rehabilitation: analysis of repeated Barthel index measures. Arch Phys Med Rehab. Jan; 1979 60(1):14–17.

26. al-Khawaja I, Wade DT, Turner F. The Barthel Index and its relationship to nursing dependency in rehabilitation. Clin Rehabil. Nov; 1997 11(4):335–337. [PubMed: 9408675]
27. Bond J, Gregson B, Smith M, Lecouturier J, Rousseau N, Rodgers H. Predicting place of discharge from hospital for patients with a stroke or hip fracture on admission. J Health Serv Res Policy. Jul; 2000 5(3):133–139. [PubMed: 11183623]
28. Alley DE, Hicks GE, Shardell M, et al. Meaningful improvement in gait speed in hip fracture recovery. J Am Geriatr Soc. Sep; 2011 59(9):1650–1657. [PubMed: 21883109]
29. Hardy SE, Perera S, Roumani YF, Chandler JM, Studenski SA. Improvement in usual gait speed predicts better survival in older adults. J Am Geriatr Soc. Nov; 2007 55(11):1727–1734. [PubMed: 17916121]
30. Spruit MA, Polkey MI, Celli B, et al. Predicting outcomes from 6-minute walk distance in chronic obstructive pulmonary disease. Journal of the American Medical Directors Association. Mar; 2012 13(3):291–297. [PubMed: 21778120]
31. Binder EF, Miller JP, Ball LJ. Development of a test of physical performance for the nursing home setting. The Gerontologist. Oct; 2001 41(5):671–679. [PubMed: 11574712]
32. Vickers AJ. Parametric versus non-parametric statistics in the analysis of randomized trials with non-normally distributed data. BMC medical research methodology. 2005; 5:35. [PubMed: 16269081]
33. Barry LC, Murphy TE, Gill TM. Depression and functional recovery after a disabling hospitalization in older persons. J Am Geriatr Soc. Jul; 2011 59(7):1320–1325. [PubMed: 21668916]
34. Liggins C, Pryor L, Bernard MA. Challenges and opportunities in advancing models of care for older adults: an assessment of the National Institute on Aging research portfolio. Journal of the American Geriatrics Society. Dec; 2010 58(12):2345–2349. [PubMed: 21070194]
35. Vong SK, Cheing GL, Chan F, So EM, Chan CC. Motivational enhancement therapy in addition to physical therapy improves motivational factors and treatment outcomes in people with low back pain: a randomized controlled trial. Arch Phys Med Rehab. Feb; 2011 92(2):176–183.
36. Landi F, Liperoti R, Bernabei R. Postacute rehabilitation in cognitively impaired patients: comprehensive assessment and tailored interventions. Journal of the American Medical Directors Association. Jul; 2011 12(6):395–397. [PubMed: 21708350]

Table 1

Examples of the three foci of Enhanced Medical Rehabilitation (EMR).

Be interactive and patient-directed	
Individualized exercise to maximize effort	"*You decided that helping care for your grandchildren, getting to church, and walking your dog are your goals. Which one of those would you like to focus on today?*"
	"*Okay, so we'll focus today's therapy on activities that will get you closer to your goal of being able to help take care of your grandchildren again. What will you need to be able to do so that you can get back to doing that?*"
	" *Just to make sure we're on the same page, can you talk me through how this activity will get you closer to your goal of helping care for your grandchildren?"*
"Ask, don't tell" patient what activity or exercise to do	" *What activity would you like to do next?"*
	" *We're going to start today by deciding which one of your goals to work on. You decided x, y, and z are important to you. Which one of those would you like to focus on today?"*
Check in with patient after each activity or exercise	" *How do you feel you did with those stairs?"…"It seems you weren't happy with how you did; how can you make getting from the bed to the wheelchair easier or safer?"*
Increased intensity	
Guide patient towards higher-intensity activities	" *Let's start off with a challenging activity. Which one of those activities we just discussed would you like to try first?"*
	"*How hard are you working?" (patient responds "4" on 0-10 scale, indicating that therapeutic exercise requires little effort) "We'd like to get you even stronger. What would it take to get you up to a 7 or 8 while doing this activity?" The patient responds with a suggestion, or the therapist then offers her ideas to increase the effort level. Alternatively, the therapist increases effort-level of an exercise automatically by adding resistance to an exercise, or suggesting a longer or faster gait training, for example.*
Individualize tasks to maximize effort	" *Do you want to see how much farther down the hall you can walk?"*
Frequent feedback on effort and progress	
Tell patient the benefits when activity/exercise was hard and comments on progress when it becomes easier.	"*How hard is this exercise?" (patient responds "9", indicating that therapeutic exercise was very difficult) "I can see you are working hard, and your heart is beating fast. That means right now you are increasing your stamina…your endurance and your heart and lung capacity are getting better.*"
	" *You rated your effort a 3 on getting dressed just now, and last week you rated it an 8. Can you see that you are getting stronger and closer to your goals?"*
Link patient's progress to goal achievement	"*Remember when you told me that you wanted to be able to walk your dog again? Well, today, you were able to walk 15 feet without much assistance. You're closer to your goal.*"
	"*Today, you walked around for 15 minutes. And you were safe and confident. You also stood strong while you put away those heavy groceries in the kitchen. That tells me that you're getting closer to your goal of cooking. It also tells me that by the time you get home, you'll be able to keep up with your grandkids.*"

Table 2

Baseline characteristics of participants in the Enhanced Medical Rehabilitation (EMR) and Standard-of-Care rehabilitation groups

Variable	EMR group (N=14) Mean ± SD	Standard-of-care group (N=12) Mean ± SD	p
Age	80.8 (7.2)	75.7 (8.96)	.12
Gender	69.23% Female 30.77% Male	83.33% Female 16.67% Male	.64
Race	7.69% Asian 46.15% Black 46.15% White	50% Black 50% White	.99
Number of therapy days while in SNF	34.9 (20.17)	29 (19.46)	.47
Body Mass Index	30.0 (11.2)	32.2 (7.3)	.59
Years of Education	14.2 (2.3)	13.3 (2.0)	.34
Short Blessed Test (higher scores: more cognitive impairment; 10+ suggests cognitive impairment)	4.3 (3.6)	5.2 (4.4)	.60
Total medical burden (Cumulative Illness Rating Scale for Geriatrics)	18.5 (2.9)	14 (3.7)	.002

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Table 3

Functional and performance improvements from SNF admission to discharge in the Enhanced Medical Rehabilitation (EMR) vs. Standard-of-care rehabilitation participants

	EMR		Standard of Care		Analysis*				
Measure	**Admission mean ± SD**	**Discharge mean ± SD**	**Admission mean ± SD**	**Discharge mean ± SD**	**Mean change in Enhanced – standard of care**	**p**	**t**	**df**	**Effect size with 95% confidence interval****
Barthel Index	32.3 ± 20.7	75.0 ± 24.2	28.3 ± 16.0	54.2 ± 30.6	16.9 ± 25.7	0.087	1.8	23	.66 (−0.20-1.52)
Gait speed (meters/second)	0.08 ± 0.12	0.39 ± 0.17	0.08 ± 0.22	0.22 ± 0.13	0.17 ±0.16	0.003	3.4	22	1.11 (0.21-2.01)
6 minute walk (feet walked)	73.0 ± 114.8	266.1 ± 202.6	40.3 ± 111.3	94.0 ± 166.0	139.4 ± 125.3	0.026	2.4	22	1.11 (0.21-2.01)

*analysis is ANCOVA comparing the change scores from baseline to discharge between the two groups, controlling for baseline scores. Reduced N in gait measures was due to one participant being paraplegic.

**effect size is Cohen's d, where 0.2=small, 0.5=medium, 0.8=large effect size. A normal approximation was used to compute confidence intervals.