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Write an exercise Rx to improve patients' cardiorespiratory fitness

Assessing physical activity is an opportunity to encourage lifestyle-based tactics for reducing cardiovascular risk. These handy tables serve as practical guides.

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PRACTICE RECOMMENDATIONS

› *Encourage children and adolescents (6 to 17 years of age) to engage in 60 min of moderate-to-vigorous physical activity, including aerobic, muscle-strengthening, and bone-strengthening endeavors on most, if not all, days of the week.* (A)

› *Encourage adults to perform approximately 150 to 300 min of moderate or 75 to 150 min of vigorous physical activity (or an equivalent combination) per week, along with moderate-intensity muscle-strengthening activities on ≥ 2 days per week.* (A)

› *Counsel patients that even a small (eg, 1-2 metabolic equivalents) increase in cardiorespiratory fitness is associated with a 10% to 30% lower rate of adverse events.* (A)

Strength of recommendation (SOR)

(A) Good-quality patient-oriented evidence

(B) Inconsistent or limited-quality patient-oriented evidence

(C) Consensus, usual practice, opinion, disease-oriented evidence, case series

It is well-known that per capita health care spending in the United States is more than twice the average in other developed countries[1]; nevertheless, the overall health care ranking of the US is near the bottom compared to other countries in this group.[2] Much of the reason for this poor relative showing lies in the fact that the US has employed a somewhat traditional fee-for-service health care model that does not incentivize efforts to promote health and wellness or prevent chronic disease. The paradigm of promoting physical activity for its disease-preventing and treatment benefits has not been well-integrated in the US health care system.

In this article, we endeavor to provide better understanding of the barriers that keep family physicians from routinely promoting physical activity in clinical practice; define tools and resources that can be used in the clinical setting to promote physical activity; and delineate areas for future work.

Glaring hole in US physical activity education

Many primary care physicians feel underprepared to prescribe or motivate patients to exercise. The reason for that lack of preparedness likely relates to a medical education system that does not spend time preparing physicians to perform this critical task. A study showed that, on average, medical schools require only 8 hours of physical activity education in their curriculum during the 4 years of schooling.[3] Likewise, the average primary care residency program offers only 3 hours of didactic training on physical activity, nutrition, and obesity.[4] The problem extends to sports medicine fellowship training, in which a 2019 survey showed that 63% of fellows were never taught how to write an exercise prescription in their training program.[5]

Without education on physical activity, medical students, residents, and fellows are woefully underprepared to

realize the therapeutic value of physical activity in patient care, comprehend current physical activity guidelines, appropriately motivate patients to engage in exercise, and competently discuss exercise prescriptions in different disease states. Throughout their training, it is imperative for medical professionals to be educated on the social determinants of health, which include the conditions in which people live, work, and play. These environmental variables can contribute to health inequities that create additional barriers to improvement in physical fitness.[6]

Medical professionals must be educated on the social determinants of health, including conditions in which people live, work, and play, which can contribute to health inequities.

National guidelines on physical activity

The 2018 National Physical Activity Guidelines detail recommendations for children, adolescents, adults, and special populations.[7] The guidelines define physical activity as bodily movement produced by skeletal muscles that result in energy expenditure above resting baseline levels, and includes all types, intensities, and domains of activity. Exercise is a subset of physical activity characterized as planned, structured, repetitive, and designed to improve or maintain physical fitness, physical performance, or health.

Highlights from the 2018 guidelines include[7]:

- **Preschool-aged children** (3 to 5 years of age) should be physically active throughout the day, with as much as 3 hours per day of physical activity of all intensities—light, moderate, and vigorous.
- **Older children and adolescents** (6 to 17 years) should accumulate 60 minutes per day of moderate-to-vigorous physical activity, including aerobic, muscle-strengthening, and bone-strengthening activities.
- **Adults of all ages** should achieve approximately 150 to 300 minutes of moderate or 75 to 150 minutes of vigorous physical activity (or an equivalent combination) per week, along with at least 2 days per week of muscle-strengthening activities. Other types of physical activity include flexibility, balance, bone-strengthening, and mind–body exercises.

3-step framework for enhancing physical activity counseling

Merely knowing that physical activity is healthy is not enough, during a patient encounter, to increase the level of physical activity. Therefore, it is imperative to learn and adopt a framework that has proved to yield successful outcomes. The Screening, Brief Intervention, and Referral to Treatment (SBIRT) framework, which has predominantly been used to change patient behavior related to alcohol and substance use, is now being utilized by some providers to promote physical activity.[8] We apply the SBIRT approach in this article, although research is lacking on its clinical utility and outcome measures.

SBIRT: Screening

An office visit provides an opportunity to understand a patient's level of physical activity. Often, understanding a patient's baseline level of activity is only asked during a thorough social history, which might not be performed during patient encounters. As physical activity is the primary determinant of cardiorespiratory fitness (CRF), some health care systems have begun delineating physical activity levels as a vital sign to ensure that the assessment of physical activity is a standard part of every clinical encounter. At a minimum, this serves as a prompt and provides an opportunity to start a conversation around improving physical activity levels when guidelines are not being met.

The exercise vital sign. Assessment and documentation of physical activity in the electronic health record are not yet standardized; however, Kaiser Permanente health plans have implemented the exercise vital sign, or EVS, in its HealthConnect (Epic Systems) electronic health record. The EVS incorporates information about a patient's:

- days per week of moderate-to-strenuous exercise (eg, a brisk walk)
- minutes per day, on average, of exercise at this level.

The physical activity vital sign. Intermountain Healthcare implemented the physical activity vital sign, or PAVS, in its iCentra (Cerner Corp.) electronic health record. The 3-question PAVS assessment asks:

- On average, how many days of the week do you perform physical activity or exercise?
- On average, how many total minutes of physical activity or exercise do you perform on those days?
- How would you describe the intensity of your physical activity or exercise: Light (ie, a casual walk)? Moderate (a brisk walk)? Or vigorous (jogging)?

PAVS includes a fourth data point: The physician–user documents whether the patient was counseled to start, increase, maintain, or modify physical activity or exercise.

EVS and the PAVS have demonstrated validity.[9-11]

Cardiorespiratory fitness as a vital sign. In 2016, the American Heart Association (AHA) asserted the importance of assessing CRF as a clinical vital sign.[12] CRF is commonly expressed as maximal oxygen consumption (VO_2max = O_2 mL/kg/min) and measured through cardiopulmonary exercise testing (CPET), considered the gold standard by combining conventional graded exercise testing with ventilatory expired gas analysis. CPET is more objective and precise than equations estimating CRF that are derived from peak work rate. AHA recommended that efforts to improve CRF should become standard in clinical encounters, explaining that even a small increase in CRF (eg, 1 or 2 metabolic equivalents[a] [METs]) is associated with a considerably (10% to 30%) lower rate of adverse cardiovascular events.[12]

De Souza de Silva and colleagues revealed an association between each 1-MET increase in CRF and per-person annual health care cost savings (adjusted for age and presence of cardiovascular disease) of $3272 (normal-weight patients), $4252 (overweight), and $6103 (obese).[13] In its 2016 scientific statement on CRF as a vital sign, AHA listed several methods of estimating CRF and concluded that, although CPET involves a higher level of training, proficiency, equipment, and, therefore, cost, the independent and additive information obtained justifies its use in many patients.[12]

[a] Defined as O_2 consumed while sitting at rest; equivalent to 3.5 mL of O_2 × kg of body weight × min.

CASE ▶

Mary Q, 68 years of age, presents for an annual well-woman examination. Body mass index is 32; resting heart rate (HR), 73 bpm; and blood pressure, 126/74 mm Hg. She reports being inactive, except for light walking every day with her dog around the neighborhood, which takes them approximately 15 minutes. She denies any history or signs and symptoms of cardiovascular, metabolic, or renal disease.

You consider 3 questions before taking next steps regarding increasing Ms. Q's activity level:

- What is her PAVS?
- Does she need medical clearance before starting an exercise program?
- What would an evidence-based cardiovascular exercise prescription for Ms. Q look like?

SBIRT: Brief intervention

When a patient does not meet the recommended level of physical activity, you have an opportunity to deliver a brief intervention. To do this effectively, you must have adequate understanding of the patient's receptivity for change. The transtheoretical, or Stages of Change, model proposes that a person typically goes through 5 stages of growth—precontemplation, contemplation, preparation, action, and maintenance—in the process of lifestyle modification. This model highlights the different approaches to exercise adoption and maintenance that need to be taken, based on a given patient's stage at the moment.

Using this framework, you can help patients realize intrinsic motivation that can facilitate progression through each stage, utilizing techniques such as motivational interviewing—so-called *change talk*—to increase self-efficacy.[14] **TABLE 1**[15] provides examples of motivational interviewing techniques that can be used during a patient encounter to improve health behaviors, such as physical activity.

Writing the exercise prescription

A patient who wants to increase their level of physical activity should be offered a formal exercise prescription, which has been shown to increase the level of physical activity, particularly in older patients. In fact, a

The SBIRT framework, predominantly used to change patient behavior related to alcohol and substance use, is now being utilized by some clinicians to promote physical activity.

TABLE 1

Motivational interviewing: How to engage in change talk[15]

Approach	Description	Examples
Ask evocative questions	Ask questions about: • disadvantages of the status quo • advantages of change • optimism of change • intent to change	"What do you think will happen if you don't change anything?" "What are some benefits of becoming more physically active?" "What changes would work best for you?" "What do you intend to do?"
Importance "ruler"	Ask simple questions to assess how important physical activity is to the person and what might make it more important	"On a scale of 1-10, how important is it for you to be physically active?" After patient responds: "Why do you believe that?" "What would it take for you to increase the importance of exercise?"
Confidence "ruler"	Ask simple questions to assess the person's confidence and what might increase their confidence in change	"How confident are you that you can engage in regular physical activity?" After patient responds: "What makes you feel that way?" "What would it take for you to feel more confident about this?"
Exploring pros and cons	Encourage the person to discuss the positive and negative aspects of their present behavior	"What do you like about being physically inactive?" "Are there disadvantages of being physically inactive?"
Elaborate	When there are arguments for change, encourage the person to elaborate to reinforce change talk	"You said exercise might make you feel better. Can you tell me more about that?"
Query extremes	When there is little desire to change, encourage them to consider extreme consequences of not changing and best consequences of changing	"Suppose you continue on as you have—without physical activity in your life. What do you imagine are the worst things that might happen to you?" "What might be the best results you could imagine if you make a change?"
Look back	Help the person remember a time in their life when they were physically active	"You mentioned that you used to walk regularly. What was that like?"
Look forward	Help the person envision a changed future	"If you don't like what you see about your future self, how would you like things to be different?"
Explore values and goals	Ask the person to tell you what things are most important in their life; then ask if being inactive fits that picture	"What in life is most important to you?" After patient responds: "Does being physically active or inactive matter to this?"

Adapted from Riebe D, et al (2018).[15]

study conducted in Spain in the practices of family physicians found that older patients who received a physical activity prescription increased their activity by 131 minutes per week; and compared to control patients, they doubled the minutes per week devoted to moderate or vigorous physical activity.[16]

FITT-VP. The basics of a cardiovascular exercise prescription can be found in the FITT-VP (**F**requency, **I**ntensity, **T**ime, **T**ype, **V**olume, and [monitoring of] **P**rogression) framework (**TABLE 2**[17-19]). For most patients, this model includes 3 to 5 days per week of moderate-to-vigorous physical activity for 30 to 60 minutes per session. For patients with established chronic disease, physical activity provides health benefits but might require modification. Disease-specific patient handouts for exercise can be downloaded, at no cost, through the American College of Sports Medicine (ACSM) "Exercise Is Medicine" program, which can be found at: www.

TABLE 2

Writing the cardiovascular exercise Rx[17-19]

Parameter	Remarks
Frequency	• 5 d/wk of moderate exercise *or* • 3 d/wk of vigorous exercise *or* • a combination of moderate and vigorous exercise
Intensity	• *Light*: 30%-39% of HRR (or VO_2R)-intensity exercise might be beneficial in a deconditioned person, requiring < 3.0 METs (examples: walking at a slow or leisurely pace [≤ 2 mph], cooking-related activities, light household chores) • *Moderate*: 40%-59% of HRR (or VO_2R)-intensity exercise, requiring 3.0 - < 6.0 METs (examples: walking briskly (2.5-4 mph), playing doubles tennis, raking the yard) • *Vigorous*: ≥ 60%-89% of HRR (or VO_2R)-intensity exercise, requiring ≥ 6.0 METs (examples: jogging, running, carrying a heavy load of groceries [or other loads] up a flight of stairs, shoveling snow, participating in a strenuous fitness class)
Time	• 150 min/wk of moderate exercise *or* • 75 min/wk of vigorous exercise *or* • a combination of moderate and vigorous exercise[a]
Type	Regular, purposeful exercise that involves major muscle groups and is continuous and rhythmic in nature
Volume	Defined as *calories/min* × *mins/workout* × *workouts/wk* [eg, 1000 kcal/wk *or* ≥ 500-1000 MET min/wk]
Progression (***p***eriodization)	Gradual progression of exercise volume by adjusting exercise frequency, duration, and intensity is reasonable until the desired exercise goal (maintenance) is attained

HRR, heart rate reserve; MET, metabolic equivalent; mph, miles per hour; VO_2R, maximal reserve O_2 consumption.

[a] 250-300 min/wk enhances long-term weight-loss maintenance.

exerciseismedicine.org/support_page.php/rx-for-health-series.

Determining intensity level. Although CPET is the gold standard for determining a patient's target intensity level, such a test might be impracticable for a given patient. Surrogate markers of target intensity level can be obtained by measuring maximum HR (HRmax), using a well-known equation[20]:

$$HRmax = 220 - age$$

which is then multiplied by intensity range:

- light: 30%-39%
- moderate: 40%-59%
- vigorous: 60%-89%

or, more preferably, by calculating the HR training zone while accounting for HR at rest (HRrest). This is accomplished by calculating the HR reserve (HRR) (ie, HRR = HRmax – HRrest) and then calculating the target heart rate (THR)[21]:

$$THR = [HRR \times \%intensity] + HRrest$$

The THR calculation is performed twice, once with a lower %intensity and again with a higher %intensity to develop a training zone based on HRR.

The HRR equation is more accurate than calculating HRmax from 220 – age, because HRR accounts for resting HR, which is often lower in people who are better conditioned.

Another method of calculating intensity for patients who are beginning a physical activity program is the rating of perceived exertion (RPE), which is graded on a scale of 6 to 20: Moderate exercise correlates with an

Cardiovascular exercise prescription

PATIENT: Mary Q. **DATE:** December 3, 2021

℞ Incorporate walking exercise into lifestyle

Frequency

Start: 3 d/wk (in addition to continuing walks [105 min/wk] with the dog)

Intensity

HR training zone based on HRR: **97-104 bpm**, calculated by:

- HRmax (age-predicted): 220 – age (68 y) = **152**
- HRR: HRmax (152) – HRrest (73) = **79**
- Exercise intensity: light intensity range (30%-39%)
- THR [low end]: (HRR × 30%) + HRrest, (79 x .30) + 73 = **97 bpm**
- THR [high end]: (HRR × 39%) + HRrest, (79 x .39) + 73 = **104 bpm**

Time

Start: 10 min each workout

Type

Walking

Volume

30 min/wk or **90 MET min/wk***

Progression

Increase time (frequency or duration) by **< 10%/wk**

*Calculated as: frequency (3 d/wk) × time (10 min/workout) × intensity (light walking = 3 METs).

RPE of 12 to 13 ("somewhat hard"); vigorous exercise correlates with an RPE of 14 to 16 ("hard"). By adding a zero to the rating on the RPE scale, the corresponding HR in a healthy adult can be estimated when they are performing an activity at that perceived intensity.[22] Moderate exercise therefore correlates with a HR of 120 and 130 bpm.

The so-called *talk test* can also guide exercise intensity: Light-intensity activity correlates with an ability to sing; moderate-intensity physical activity likely allows the patient to still hold a conversation; and vigorous-intensity activity correlates with an inability to carry on a conversation while exercising.

An exercise prescription should be accompanied by a patient-derived goal, which can be reassessed during a follow-up visit. So-called SMART goals (**S**pecific, **M**easurable, **A**chievable, **R**elevant, and **T**ime-bound) are tools to help patients set personalized and realistic expectations for physical activity. Meeting the goal of approximately 150 to 300 minutes of moderate or 75 to 150 minutes of vigorous physical activity (or an equivalent combination) per week is ideal, but a patient needs to start where they are, at the moment, and gradually increase activity by setting what for them are realistic and sustainable goals.

CASE ▶

With a PAVS of 105 minutes (ie, 15 minutes per day × 7 days) of weekly light-to-moderate exercise walking her dog, Ms. Q does not satisfy current physical activity guidelines. She needs an exercise prescription to incorporate into her lifestyle (see "Cardiovascular exercise prescription," at left).

First, based on ACSM pre-participation guidelines, Ms. Q does not need medical clearance before initiating light-to-moderate exercise and gradually progressing to vigorous-intensity exercise.

Second, *in addition to* walking the dog for 105 minutes a week, you:

- advise her to start walking for 10 minutes, 3 times per week, at a pace that keeps her HR at 97-104 bpm.
- encourage her to gradually increase the frequency or duration of her walks by no more than 10% per week.

SBIRT: Referral for treatment

When referring a patient to a fitness program or professional, it is essential to consider their preferences, resources, and environment.[23] Community fitness partners are often an excellent referral option for a patient seeking guidance or structure for their exercise program. Using the

TABLE 3

Writing the resistance exercise Rx[17-19]

Parameter	Remarks
Frequency	Each major muscle group should be trained 2 or 3 d/wk
Intensity	• *Light*: 40%-50%, 1 RM[a] (for sedentary people) • *Moderate-to-hard*: 60%-70%, 1 RM (novice to intermediate) • *Hard-to-very hard*: ≥ 80%, 1 RM (experienced strength trainers, to improve strength)
Time	Between sets: 2-3 min of rest Between training sessions: ≥ 48 h recovery after exercise of any single muscle group
Type	Resistance exercises involving each major muscle group, with a variety of exercise equipment and body-weight exercises
Volume	Defined as *frequency* × *reps* × *sets* × *weight* **Reps** • *8-12*: improves strength and power in most adults • *10-15*: improves strength in middle-aged and older adults • *15-25*: improves muscular endurance **Sets** A single set can be effective for older and novice exercisers; 2-4 sets are recommended for most adults to improve strength and power
Progression (***p***eriodization)	Example: In the range of 8-12 reps, once muscles have adapted to the point at which 12 reps are performed easily, resistance should be increased so that no more than 12 reps are completed without significant muscle fatigue or without difficulty completing the last rep of that set (but still able to complete 8 quality reps)

Rep, repetition; 1RM, 1-rep max.

[a] 1RM is the maximum weight a person can lift for 1 rep of an exercise, through the full range of motion and using proper technique.

ACSM ProFinder service, (www.acsm.org/get-stay-certified/find-a-pro) you can search for exercise professionals who have achieved the College's Gold Standard credential.

Gym memberships or fitness programs might be part of the extra coverage offered by Medicare Advantage Plans, other Medicare health plans, or Medicare Supplement Insurance (Medigap) plans.[24]

CASE ▶

After providing Ms. Q with her exercise prescription, you refer her to a local gym that participates in the Silver Sneakers fitness and wellness program (for adults ≥ 65 years of age in eligible Medicare plans) to determine whether she qualifies to begin resistance and flexibility training, for which you will write a second exercise prescription (**TABLE 3**[17-19]).

Pre-participation screening

Updated 2015 ACSM exercise pre-participation health screening recommendations attempt to decrease possible barriers to people who are becoming more physically active, by minimizing unnecessary referral to health care providers before they change their level of physical activity. ACSM recommendations on exercise clearance include this guidance[25]:

- For a patient who is asymptomatic and already physically active—regardless of whether they have known cardiovascular, metabolic, or renal disease—medical clearance is unnecessary for moderate-intensity exercise.
- Any patient who has been physically active and asymptomatic but who becomes symptomatic during exercise should immediately discontinue such activity and undergo medical evaluation.
- For a patient who is inactive, asymptomatic, and who does not have

TABLE 4

Coding and billing pointers[26]

Select an appropriate diagnosis (ICD-10) or procedural (CPT) code that best matches the description

Description	ICD-10 code	CPT code
Exercise counseling	Z71.89	
Obesity	E66.9	
Physical deconditioning	R53.81	
Sedentary lifestyle	Z91.89	
Muscular deconditioning	R29.898	
Patient education on exercises		97110

Select a procedural code that best matches the description

Description	CPT code[a]	Clinicians eligible to bill this code
Preventive medicine counseling and/or risk factor intervention(s) provided to an individual (separate procedure); approximately 15 min	99401	Physicians and other qualified health care professionals
Preventive medicine counseling and/or risk factor intervention(s) provided to an individual (separate procedure); approximately 30 min	99402	
Preventive medicine counseling and/or risk factor reduction intervention(s) provided to an individual (separate procedure); approximately 45 min	99403	
Preventive medicine counseling and/or risk factor reduction intervention(s) provided to an individual (separate procedure); approximately 60 min	99404	
Face-to-face behavioral counseling for obesity, 15 minutes—for billing for behavioral counseling for obesity	G0447	

CPT, Current Procedural Terminology; ICD-10, International Classification of Diseases 10th Revision.

[a] CPT codes 99401-99409 report counseling risk factor reduction and behavioral change intervention services provided at an encounter separate from the preventive medicine examination. Individual preventive medicine counseling codes, 99401-99404, are used to report counseling services in areas such as family problems, diet, and exercise. This code set is for evaluation and management (E/M) services. 2008 CPT codes 99406-99409 for individual behavioral change are available to report intervention services for patients with a behavior typically regarded as an illness, such as smoking or obesity. Group counseling and other preventive medicine services are reported with codes 99411-99429. These code sets are for E/M services.

known cardiovascular, metabolic, or renal disease, medical clearance for light- or moderate-intensity exercise is unnecessary.

- For inactive, asymptomatic patients who have known cardiovascular, metabolic, or renal disease, medical clearance is recommended.

Digital health

Smartwatches and health apps (eg, CardioCoach, Fitbit, Garmin Connect, Nike Training Club, Strava, and Training Peaks) can provide workouts and offer patients the ability to collect information and even connect with other users through social media platforms. This information can be synced to Apple Health platforms for iPhones (www.apple.com/ios/health/) or through Google Fit (www.google.com/fit/) on Android devices. Primary care physicians who become familiar with health apps might find them useful for select patients who want to use technology to improve their physical activity level.

However, data on the value of using digital apps for increasing physical activity, in relation to their cost, are limited. Additional research is needed to assess their validity.

Billing and coding

For most patients, the physical activity assessment, prescription, and referral are performed in the context of treating another condition (eg, hypertension, type 2 diabetes, obesity, depression) or during a preventive health examination, and are typically covered without additional charge to the patient. An evaluation and management visit for an established patient could be used to bill if > 50% of the office visit was spent face-to-face with a physician, with patient counseling and coordination of care.

Physicians and physical therapists can use the therapeutic exercise code (Current Procedural Terminology code 97110) when teaching patients exercises to develop muscle strength and endurance, joint range of motion, and flexibility[26] (**TABLE 4**[26]).

Conclusion

Physical activity and CRF are strong predictors of premature mortality, even compared to other risk factors, such as cigarette smoking, hypertension, hypercholesterolemia, and type 2 diabetes.[27] Brief physical activity assessment and counseling is an efficient, effective, and cost-effective means to increase physical activity, and presents a unique opportunity for you to encourage lifestyle-based strategies for reducing cardiovascular risk.[28]

However, it is essential to meet patients where they are before trying to have them progress; it is therefore imperative to assess the individual patient's level of activity using PAVS. With that information in hand, you can personalize physical activity advice; determine readiness for change and potential barriers for change; assist the patient in setting SMART goals; and arrange follow-up to assess adherence to the exercise prescription. Encourage the patient to call their health insurance plan to determine whether a gym membership or fitness program is covered.

Research is needed to evaluate the value of using digital apps, in light of their cost, to increase physical activity and improve CRF in a clinical setting. Prospective trials should be initiated to determine how routine implementation of CRF assessment in primary care alters the trajectory of clinical care. It is hoped that future research will answer the question: Would such an approach improve clinical outcomes and reduce health care expenditures?[12] JFP

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The AHA has asserted the importance of assessing cardiorespiratory fitness as a "vital sign."

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FUNCTIONAL MEDICINE

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