**1) What cardiovascular risk factors does she have?**

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| --- | --- | --- |
| **CVD risk factors**  | **Case study** | **Results** |
| **Age:** men ≥45 yr; women ≥55 yr | Woman, 50 yr | No |
| **Family history:** Cardiac history before 55 yr in father or first-degree male relative or before 65 yr in mother or first-degree female relative | Not described/unknown | Positive risk |
| **Cigarette smoking**: current smoker, quit within last 6m, or environmental exposure | Described as a smoker | Positive risk |
| **Sedentary lifestyle**: not participating in at least 30 m of mod. intensity PA (40-60% VO2R) on at least 3d/wk for at least 3 m | Described as sedentary | Positive risk |
| **Obesity**: BMI is ≥30 kg/m2 or WC is greater than 88cm (among women)  | BMI ranges from 26.1 kg/m2 to 26.4 kg/m2, WC is 84 cm | No |
| **Hypertension:** SBP ≥140 mmHg and/or DBP ≥ 90 mmHg or on antihypertensive medication  | Blood pressure ranges from 126/74 to 138/80 mmHg | No |
| **Dyslipidemia:** LDL cholesterol ≥ 130mg/dL or HDL cholesterol < 40mg/dL or on lipid-lowering medication, or ≥200 mg/dL total cholesterol if that is all that is available | Triglycerides: 148 mg/dL, HDL: 76 mg/dL,LDL: 83 mg/dL,Total cholesterol: 190 mg/dL | No |
| **Prediabetes:** fasting plasma glucose ≥ 100 mg/dL but ≤ 125 mg/dL, or 2 h values in oral glucose tolerance test ≥ 140 mg/dL but ≤ 199 mg/dL, confirmed on at least 2 occasions | Diagnosed with type II diabetes mellitus in 1996. Metabolic disease, not a risk factor. | No |
| **Negative Risk factors**  |  |
| HDL cholesterol ≥ 60 mg/dL | HDL: 76 mg/dL | Negative risk |

There are 3 positive CVD risk factors (implied family history, cigarette smoking, and sedentary lifestyle) and 1 negative risk factor (HDL ≥ 60 mg/dL). **Net sum = 2 CVD risk factors.**

**2) Does she have major signs suggestive of disease? If so, please list. Yes.** Although the patient has no overt signs or symptoms of disease (*GETP9*, Figure 2.3), she has a known pulmonary disease (asthma) and a known metabolic disease (type 2 diabetes mellitus). She also has diagnoses of substance use disorder and HIV. Although the latter 2 are not risk-stratifying diseases, HIV in particular associates with several CVD risk factors (GETP9, pg. 293).

**3) What risk category is she based on your findings? The subject is classified as high risk.** Criteria for classification found in *Figure 2.3 (GETP9,* pg. 26*).*

**4) Is a medical examination necessary prior to testing and exercise participation? Why? Yes, a medical exam is necessary due to the subject’s high risk classification** (as illustrated in *GETP9*, Figure 2.4)**.** Health risks may be exacerbated by acute exercise, especially among previously sedentary patients who are initiating an exercise program (*GETP9*, pg. 31; Cobb & Weaver, 1986; JACC, 7: 215-219). Because this HAPI patient will be transitioning from a sedentary lifestyle, she may be predisposed to an elevated risk of cardiovascular events. Moreover, the information gathered during the medical exam may also be useful when subsequently designing her ExRx (*GETP9*, pg. 32).

**5) Is physician clearance needed prior to enrollment into your research study? Why? Yes.** All subjects enrolling in HAPI are classified as high risk and, depending on randomization, enrollment may involve routine participation in an exercise/PA program. This particular subject is unaccustomed to PA and has known metabolic and pulmonary diseases in addition to diagnoses of HIV and substance use disorder. The transition from a sedentary lifestyle to one marked by habitual exercise and PA carries health risks. Additionally, physician clearance prior to enrollment is a proper step in the management of liability (*GETP9*, pg. 33).

**6) Summarize the health/fitness assessment results as they will serve as the basis for the exercise prescription that you will design for her.**

|  |  |  |
| --- | --- | --- |
| **VARIABLE** | **SCORE** | **CLASSIFICATION** |
| Resting heart rate | 113 bpm | Very poor1 |
| Sit-and-reach | 29.5 cm | Fair2 |
| Handgrip strength | 70 kg | Excellent3 |
| Floor transfer test | 3.66 s | Better than comparison population4 |
| YMCA Cycle Ergometer test | 21.0 ml/kg/min | Between poor and very poor2 |

1. Golding et al. (1989). 2. *GETP9, 2013*. 3. *Canadian Physical Activity, Fitness & Lifestyle* *Approach* manual, 3rd edition. 4. Wang et al., 2005.

**7) What are her “special conditions/considerations”?**

**Pharmacological profile.** The pharmacological agents this patient regularly uses are Reyataz, Norvir, Truvada (antiretroviral agents), Ventolin (bronchodilator), and Novolog (rapid acting insulin). The antiretroviral agents are unlisted in Appendix A(*GETP9, 2013*), but are reported to commonly induce diarrhea, headache, abdominal pain, nausea, and fatigue while elevating CVD risk (*Micromedex*, 2013). The summation of these effects is an exaggerated variability in one’s day-to-day health. ExRx must reflect these daily fluctuations. The patient’s insulin prescription is not listed in Table A.1. *(GETP9, 2013*), but has reported side effects of hypoglycemia (27% to 75% incidence) and less commonly lipodystrophy (*Micromedex*, 2013). Insulin dosing (and carbohydrate intake) should be monitored relative to the timing and qualities (particularly duration and intensity) of exercise to prevent hypoglycemia (<70 mg/dL) or hyperglycemia (≥126 mg/dL). Blood glucose should be measured prior to and for up to 12 h after exercise (*GETP9,* pgs. 278-284; Exercise and Type 2 Diabetes, *ACSM Joint Position Statement*, 2283-84). The patient’s bronchodilator may accelerate her HR (Table A.1., *GETP9, 2013*), which can result in HR-based intensity measures overestimating her true intensity. Gauging intensity with a secondary measure such as a Borg scale may be appropriate.

**HIV.** When monitoring the variability of the patient’s day-to-day health changes (as noted above), minor increases in fatigue or shortness of breath should not preclude participation, but dizziness, swollen joints or vomiting should. At the onset of her workout program, the choice of exercise modality should enable supervision. The mode of exercise (and testing) should also be appropriate to her capacities while minimizing disease transmission (i.e., no contact sports) (*GETP9*, pgs. 293-295).

**Type 2 diabetes mellitus.** In the absence of contraindication, a combination of aerobic and resistance exercise should be performed, using large muscle groups. Most exercise-induced benefits to type 2 DM management result from improvements to insulin action, the majority of which is attributed to acute effects. These benefits are more robust in response to longer durations and higher intensities (*ACSM Joint Position Statement*, 2284-86). Therefore, the patient’s ExRx should progress to include a greater volume as she is able to tolerate it. Regarding exercise environment, thermoregulation is often impaired among people with type 2 DM, so precautions may be warranted if exercising in hot or cold climates. In addition to monitoring blood glucose and exercise/insulin timing (as noted above), signs for hypoglycemia (shakiness, hunger, headache, visual disturbances, etc.) and hyperglycemia (fatigue, hunger, excessive thirst, tingling in extremities, etc.) should be monitored. For this reason, it is prudent for the patient to exercise with a partner or under supervision (*GETP9*, pgs. 278-284). If the patient presents with low blood glucose prior to engaging in exercise, carbohydrate should be provided and exercise may commence when normal values are regained. Conversely, if the patient presents with hyperglycemia, but has no ketone bodies present in her blood or urine and feels well enough to exercise, exercise is permitted. However, her blood glucose should be monitored often and vigorous exercise avoided until glucose levels begin declining (*GETP9*, pg. 283).

**Arthritis.** If the patient experiences an acute flare up, strenuous exercise and exercise testing should be postponed until it subsides. Light activities may still be performed during these times, focusing on moving joints through their full range of motion. When regular exercise is conducted, sessions should occur during the time of day in which pain is least severe and the mode prescribed should reflect that which is best tolerated, incorporating neuromotor and functional exercises where possible. Proper footwear should be worn and adequate warm-up and cool-down periods (5-10 min) should be provided (*GETP9*, pgs. 261-263).

**Asthma.** The patient’s inhaler should be used prophylactically to prevent exercise-induced bronchoconstriction. If her asthma is acutely symptomatic, exercise should not be conducted until airway function has improved. This can be objectively assessed using a peak flow meter, providing an initial peak reading has been collected. The exercise environment should also be considered, actively avoiding pollutants, pollens, cold air, etc. (*GETP9*, pgs. 332-334).

**Age.**  Although the patient’s *chronological* age does not constitute a risk factor, her *physiologic* aging (compounded by deconditioning and disease states) classifies her as an “older adult” (*GETP9*, pg. 204). *The Guidelines* recommend older adults initiate an ExRx with light activity (<3 METs) and increase workload conservatively. Other variables to consider include possible limitations in balance, muscular strength, coordination, increases in fatigue, and impairments in gait patterns. The progression of physical activities must be individualized to reflect her capacities in each of these (*GETP9*, pg. 205-210).

**8) What other healthcare professionals should you consult when designing her exercise prescription?** Her case manager at Connections, primary care physician, and HIV specialist (if she has one) should be included. Her case manager may know personal details affecting exercise capacity/performance (e.g., “I haven’t been sleeping well”, “I used drugs twice last week”). Her primary care physician and/or HIV specialist may have medical information (e.g., “her CD4+ count is at 350”) which would help weigh the risks verses benefits of exercise engagement.

**9) Formulate her FITT-VP exercise prescription including special considerations.** This patient has HIV, substance use disorder, type 2 DM, and arthritis. She smokes, is overweight, leads a sedentary lifestyle, and is considered an “older adult” due to the combination of her age and disease profile. Having fallen down a flight of stairs 17 months ago, it’s possible she has lasting musculoskeletal injuries. In addition to having a history of crack cocaine use, she takes 7 pharmacological agents to treat her various diseases and disabilities (details listed above). She has prehypertension but has a favorable lipid profile. Her VO2 and RHR suggest poor cardiopulmonary fitness, while her grip strength and floor transfer test suggest above average strength and physical functioning. Lastly, her sit-and-reach score suggests the upper end of fair flexibility. Using the advice on page 344 of *GETP9*, I’ve chosen to base her FITT-VP on the disease that confers the greatest risk (type 2 DM). Not only can type 2 DM result in death via acutely uncontrolled glycemia, but its chronic effects increase the risk of CVD. Her prescription will also incorporate other major diseases/health conditions that may be limiting to her participation in exercise (HIV, asthma, and arthritis).

The FITT-VP provided for DM (*GETP9*, pgs. 281-282) will serve as the foundation of this ExRx: **Frequency:** 3–7 days a week. **Intensity:** 40%–<60% VO2R. **Time:** periodic bouts of at least 10 min totaling at least 150 min a week. **Type:** activities and exercise that recruit large muscle groups in a rhythmic and continuous fashion.

**Considerations:** Improvement of cardiopulmonary health will be a primary goal considering her strength and physical functioning already appear adequate while her VO2 and RHR indicate very poor cardiopulmonary health. However, due to the prevalence of muscle wasting and osteopenia among people with HIV, RE will be included as a maintenance/prophylactic measure. The RE prescription will follow the recommendations for HIV provided on pgs. 294-295 (60% 1-RM for 8-10 repetitions per set, 2-3 sets per exercise over 30 min). This patient already exhibits fair flexibility, so the guidelines for healthy adults will be suggested (2-3 days/week, holding each stretch 30-60 s; details provided in Table 7.7 on pg. 188). Due to the patient’s poor cardiopulmonary fitness, the flexibility training can be integrated into her aerobic exercise routine. Due to her arthritis and status as an “older adult”, neuromotor and functional exercises will be included, in part to mitigate or avoid a fear of falling. The type of activities chosen for exercise will reflect not only her capacities (and no activities where bleeding may be likely), but also her interests.

**Progression:** As the subject is capable, the time component will be gradually increased to ≥300 min a week (of moderate-to-vigorous PA) to accrue additional benefits to diabetic control. Glucose may also be better controlled via higher intensities (≥60% VO2R). If the subject’s HIV symptoms permit this level of intensity, and it does not exacerbate her arthritis, this will be considered for the future progression. However, as indicated in *GETP9* (pg. 31) physically unfit individuals should begin with light to moderate intensity and progress only as fitness improves.