**Perimenopausal Women (Around Menopause Transition):**

* Treatment goals focus on controlling menstrual cycle irregularities, providing contraception, and relieving symptoms.
* Combined oral contraceptive pills or cyclical MHT can be considered for symptom relief and cycle control.
* Levonorgestrel-releasing intrauterine device (IUD) may be used for contraception and suppressing the endometrium.

**Postmenopausal Women (After Menopause):**

* MHT is recommended for alleviating menopausal symptoms like hot flashes, night sweats, and vaginal dryness.
* For women with a uterus, estrogen therapy should be combined with progestogen to protect the endometrium.
* For women without a uterus, estrogen-only therapy is suitable unless there's a history of endometriosis or subtotal hysterectomy.
* Transdermal (through the skin) estrogen may be preferred for women at risk of venous thromboembolism (VTE).
* Testosterone therapy may be considered for postmenopausal women experiencing sexual desire dysfunction but should be monitored for side effects.

**Considerations for Premenopausal Women:**

HRT is typically not recommended, with exceptions:

* Women under 40 who experience early menopause or POI
* Those who experience severe Menopausal-like symptoms

**Notes:**

* MHT is most effective for symptom relief when started within 10 years of menopause or before the age of 60.
* Regular follow-ups are important to reassess the need for continued therapy and monitor for any side effects.

**States (S)**

1. **Menopausal Status**: Pre-menopause, Peri-menopause, Post-menopause.
2. **Symptom Severity**: Quantitative states derived from MRS Scale as reported via Fitbit, with categories for hot flushes, night sweats, and vaginal dryness
3. **HRT Treatment Response**: Good response, Moderate response, Poor response, Side effects.
4. **Risks**: None, Osteoporosis risk, Cardiovascular risk, etc.
5. **Lifestyle Factors**: Physical activity level, sleep quality, dietary habits [Fitbit]

**Actions (A)**

* **Initiate HRT:**
  + Cyclical HRT (CyHRT)
  + Continuous Combined HRT (CoHRT)
  + Estrogen Only HRT (EOHRT)
  + Transdermal Estrogen (TE)
  + Testosterone Therapy (TT)
* **Alter HRT:** Adjust dosage or change to another form within the same category (e.g., from CyHRT to CoHRT).
* **Discontinue HRT (DcHRT)**
* **Further Testing (FT)** for detailed diagnosis.

**Observation Model (Z)**

Probabilities represent the likelihood of observing a certain symptom given the actual state of the patient.

Z(o∣s,a): Probability of observing o given that the action a has been taken and the patient is actually in state s.

**Transition Model (T)**

*T*(*s*′∣*s*,*a*): Probability of moving to state *s*′ from state *s* after taking action *a*.

**Observations (O)**

Observations are derived from the Fitbit data and the MRS scale as well as any additional clinical assessments:

**Reported Symptoms via Fitbit:** Hot flushes (HF), Night sweats (NS), Vaginal dryness (VD), Sleep quality (SQ), Anxiety (Anx)

**Clinical Follow-up:** Through regular consultations (Not directly measurable via Fitbit but important for model consideration)

**Reward Function (R)**

The reward function prioritizes symptom relief, treatment effectiveness, and the patient's quality of life:

**Rewards** for symptom improvement, no side effects, and stable condition.

**Penalties** for worsening symptoms, side effects, and any risks involved.