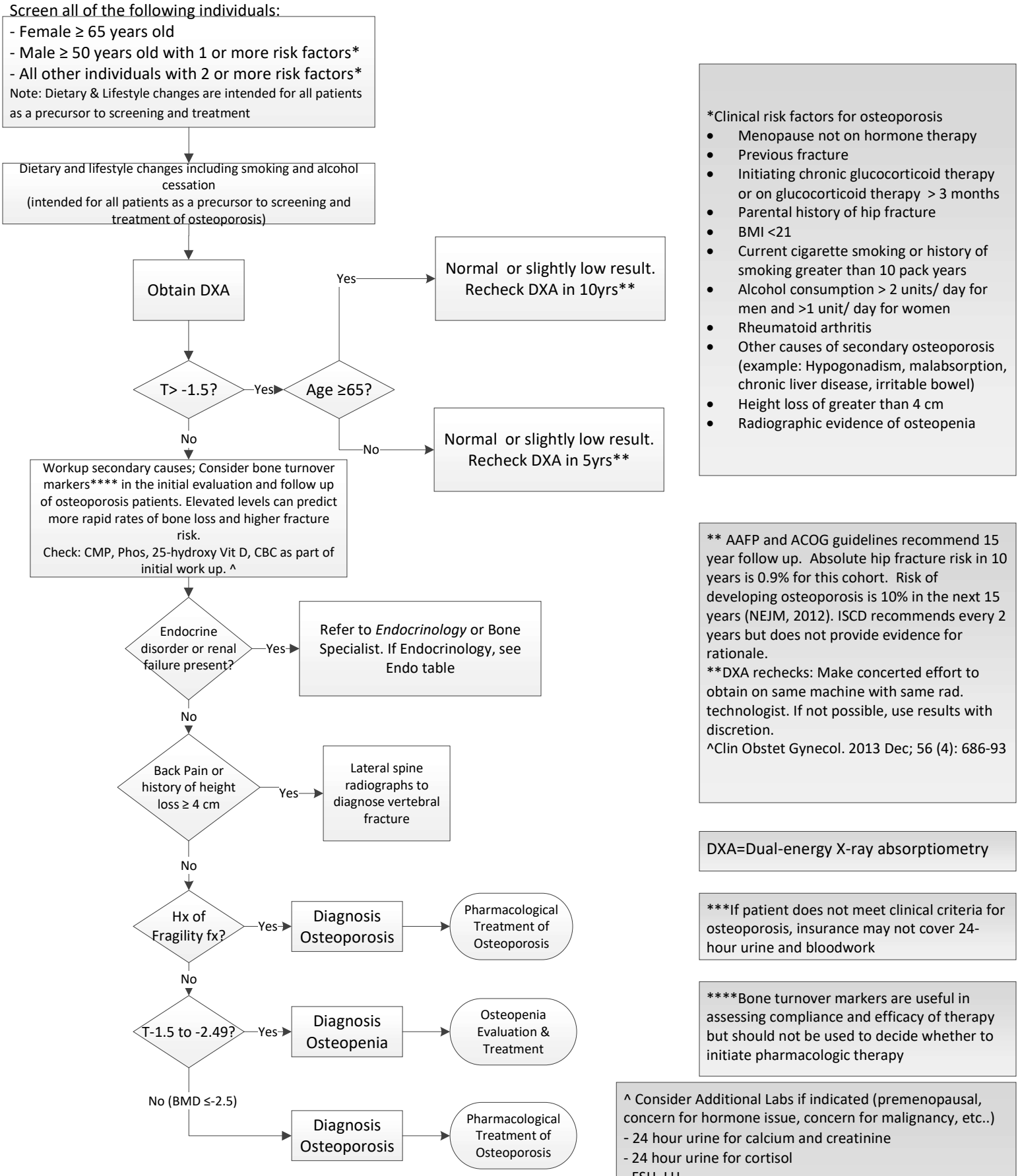


*Clinical risk factors for osteoporosis

- Menopause not on hormone therapy
- Previous fracture
- Initiating chronic glucocorticoid therapy or on glucocorticoid therapy > 3 months
- Parental history of hip fracture
- BMI <21
- Current cigarette smoking or history of smoking greater than 10 pack years
- Alcohol consumption > 2 units/ day for men and >1 unit/ day for women
- Rheumatoid arthritis
- Other causes of secondary osteoporosis (example: Hypogonadism, malabsorption, chronic liver disease, irritable bowel)
- Height loss of greater than 4 cm
- Radiographic evidence of osteopenia

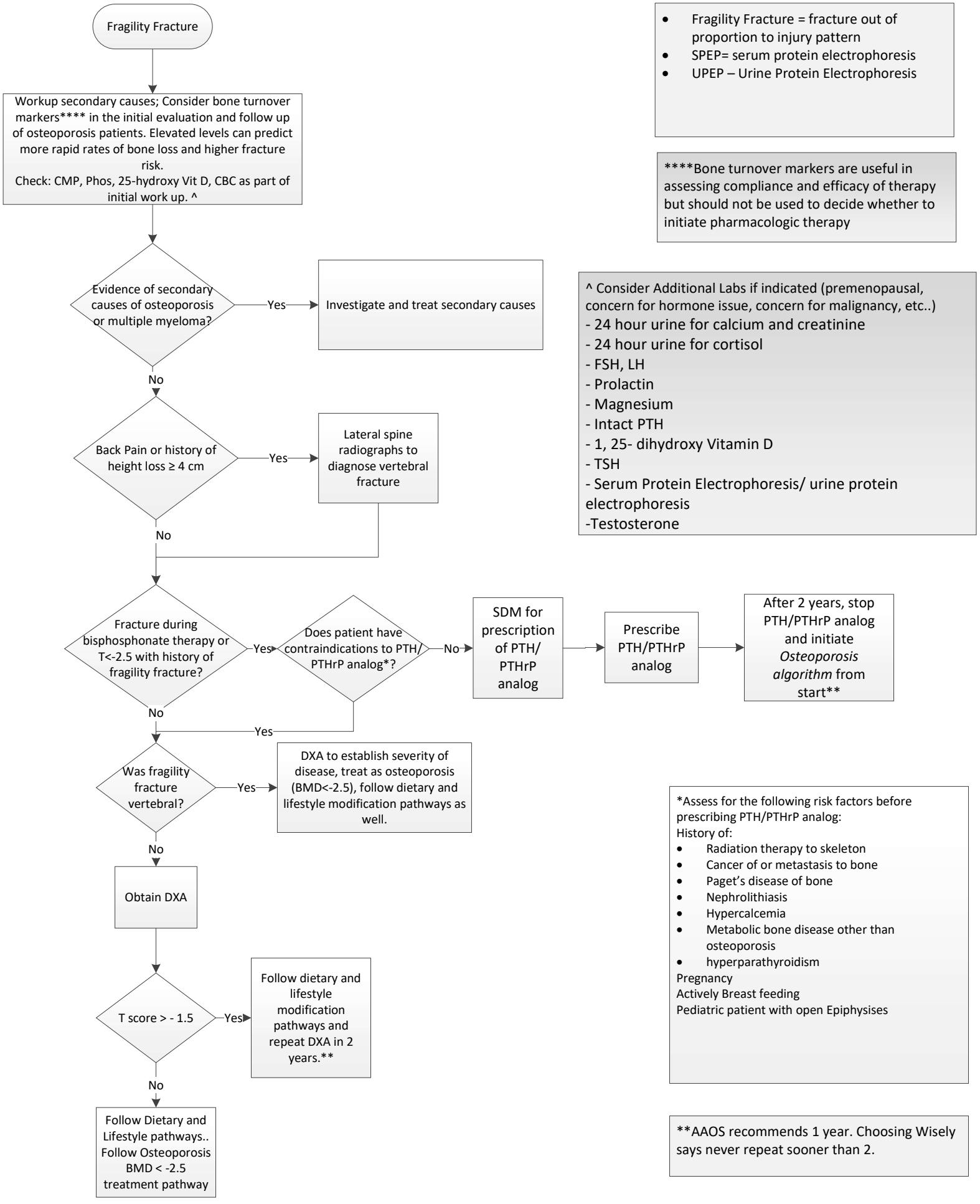
** AAFP and ACOG guidelines recommend 15 year follow up. Absolute hip fracture risk in 10 years is 0.9% for this cohort. Risk of developing osteoporosis is 10% in the next 15 years (NEJM, 2012). ISCD recommends every 2 years but does not provide evidence for rationale.
**DXA rechecks: Make concerted effort to obtain on same machine with same rad. technologist. If not possible, use results with discretion.
^Clin Obstet Gynecol. 2013 Dec; 56 (4): 686-93

DXA=Dual-energy X-ray absorptiometry

***If patient does not meet clinical criteria for osteoporosis, insurance may not cover 24-hour urine and bloodwork

****Bone turnover markers are useful in assessing compliance and efficacy of therapy but should not be used to decide whether to initiate pharmacologic therapy

^ Consider Additional Labs if indicated (premenopausal, concern for hormone issue, concern for malignancy, etc..)
- 24 hour urine for calcium and creatinine
- 24 hour urine for cortisol
- FSH, LH
- Prolactin
- Magnesium
- Intact PTH
- 1, 25- dihydroxy Vitamin D
- TSH
- Serum Protein Electrophoresis/ urine protein electrophoresis
-Testosterone


Fragility Fracture
Workup secondary causes; Consider bone turnover markers**** in the initial evaluation and follow up of osteoporosis patients. Elevated levels can predict more rapid rates of bone loss and higher fracture risk.
Check: CMP, Phos, 25-hydroxy Vit D, CBC as part of initial work up. ^
Evidence of secondary causes of osteoporosis or multiple myeloma?
Yes
Investigate and treat secondary causes
No
Back Pain or history of height loss ≥ 4 cm
Yes
Lateral spine radiographs to diagnose vertebral fracture
No
Fracture during bisphosphonate therapy or T<-2.5 with history of fragility fracture?
Yes
Does patient have contraindications to PTH/ PTHrP analog*?
No
SDM for prescription of PTH/ PTHrP analog
Prescribe PTH/PTHrP analog
After 2 years, stop PTH/PTHrP analog and initiate *Osteoporosis algorithm* from start**
No
Yes
Was fragility fracture vertebral?
Yes
DXA to establish severity of disease, treat as osteoporosis (BMD<-2.5), follow dietary and lifestyle modification pathways as well.
No
Obtain DXA
T score > - 1.5
Yes
Follow dietary and lifestyle modification pathways and repeat DXA in 2 years.**
No
Follow Dietary and Lifestyle pathways.. Follow Osteoporosis BMD < -2.5 treatment pathway
• Fragility Fracture = fracture out of proportion to injury pattern
• SPEP= serum protein electrophoresis
• UPEP – Urine Protein Electrophoresis
****Bone turnover markers are useful in assessing compliance and efficacy of therapy but should not be used to decide whether to initiate pharmacologic therapy
^ Consider Additional Labs if indicated (premenopausal, concern for hormone issue, concern for malignancy, etc..)
- 24 hour urine for calcium and creatinine
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- Prolactin
- Magnesium
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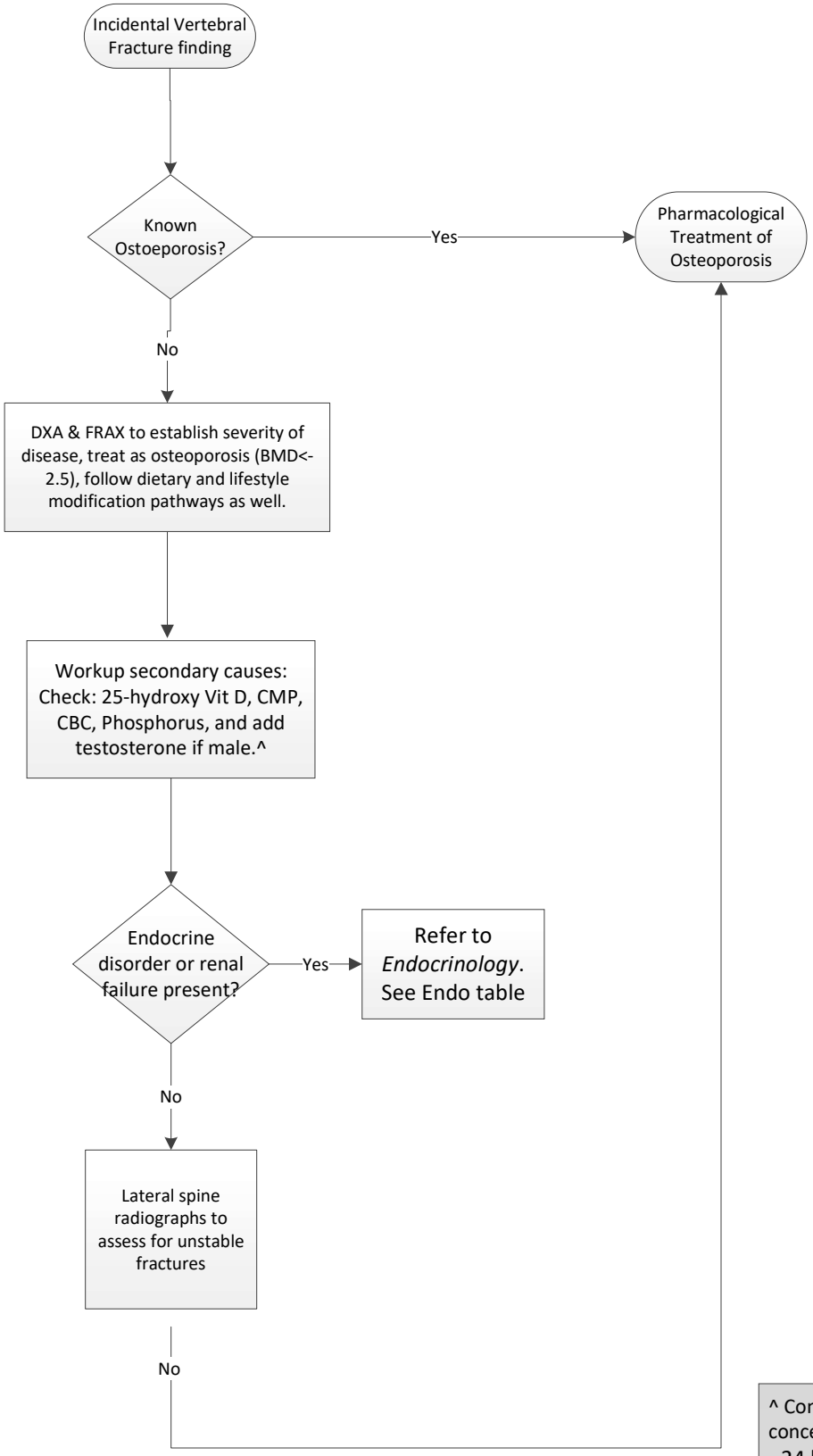
- TSH
- Serum Protein Electrophoresis/ urine protein electrophoresis
-Testosterone
*Assess for the following risk factors before prescribing PTH/PTHrP analog:
History of:
• Radiation therapy to skeleton
• Cancer of or metastasis to bone
• Paget's disease of bone
• Nephrolithiasis
• Hypercalcemia
• Metabolic bone disease other than osteoporosis
• hyperparathyroidism
Pregnancy
Actively Breast feeding
Pediatric patient with open Epiphysises
**AAOS recommends 1 year. Choosing Wisely says never repeat sooner than 2.



^ Consider Additional Labs if indicated (premenopausal, concern for hormone issue, concern for malignancy, etc..)

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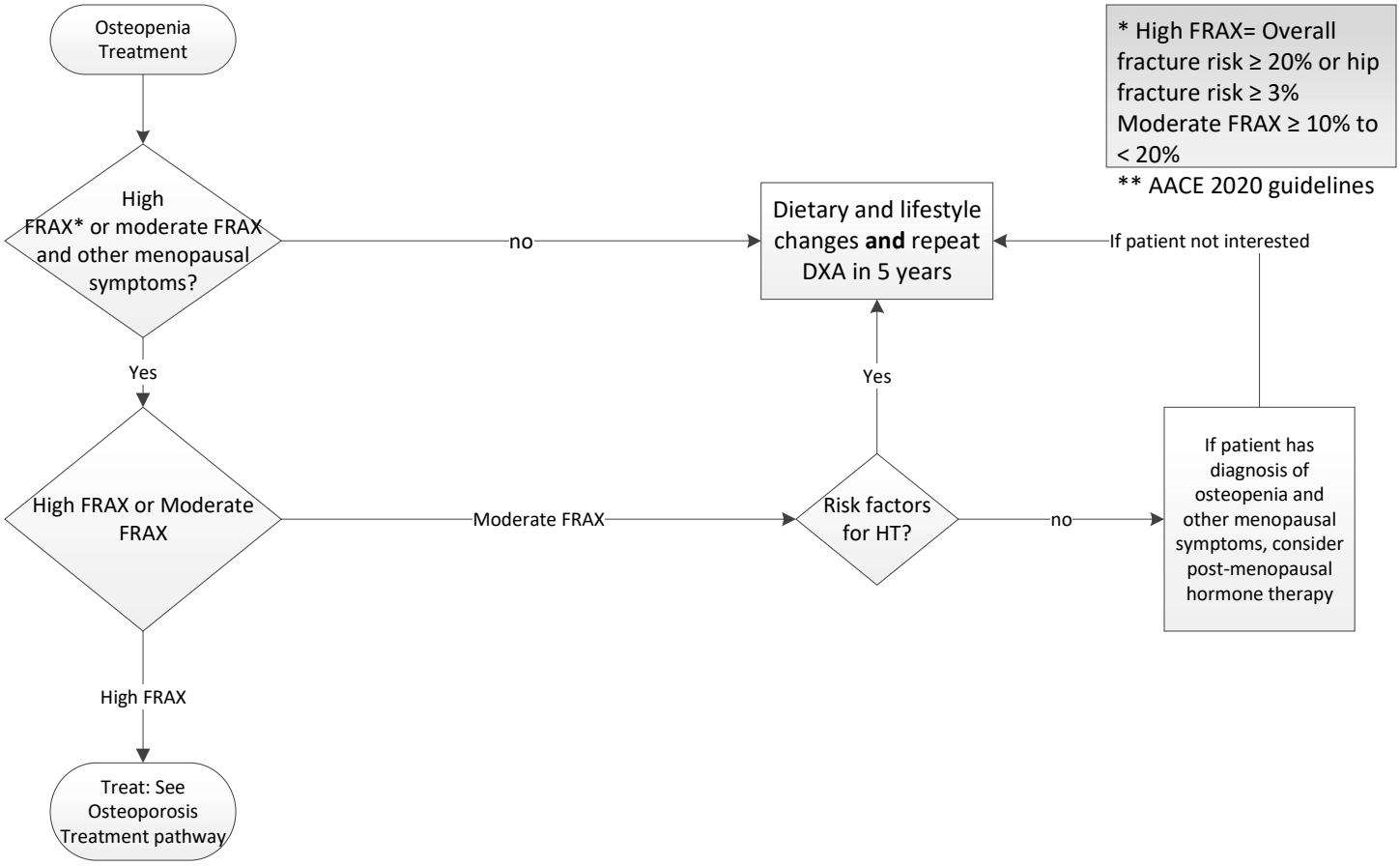
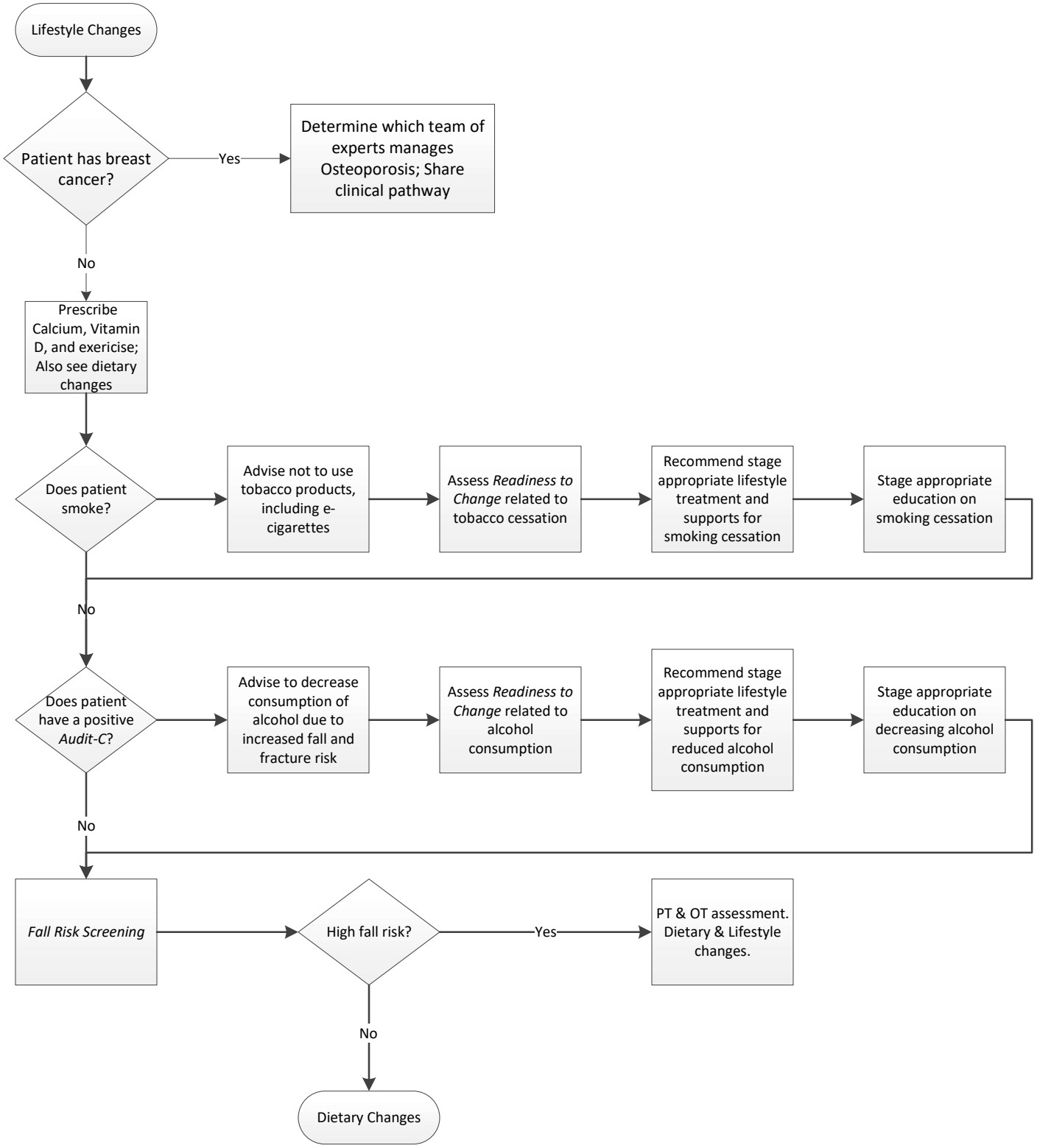
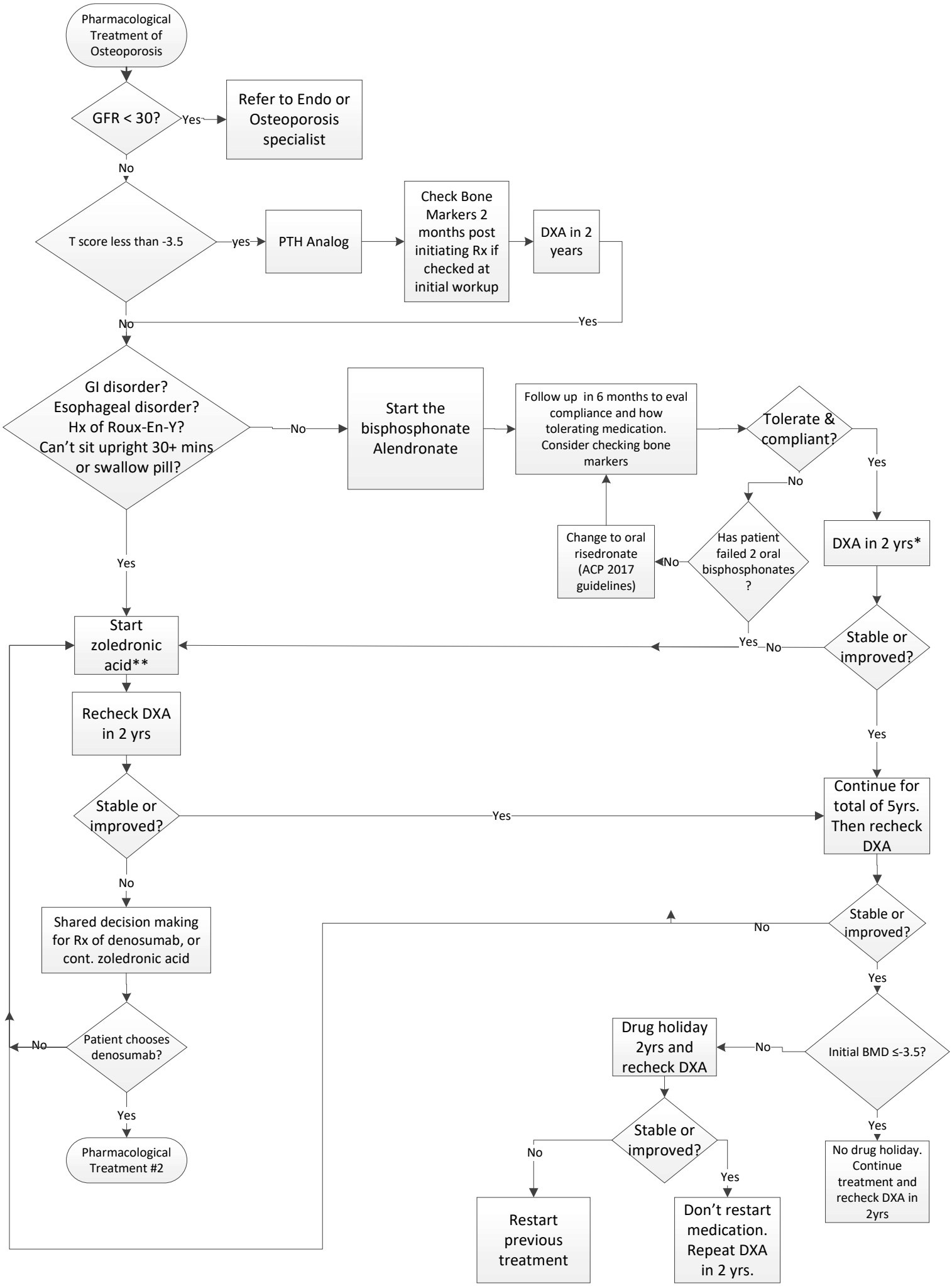
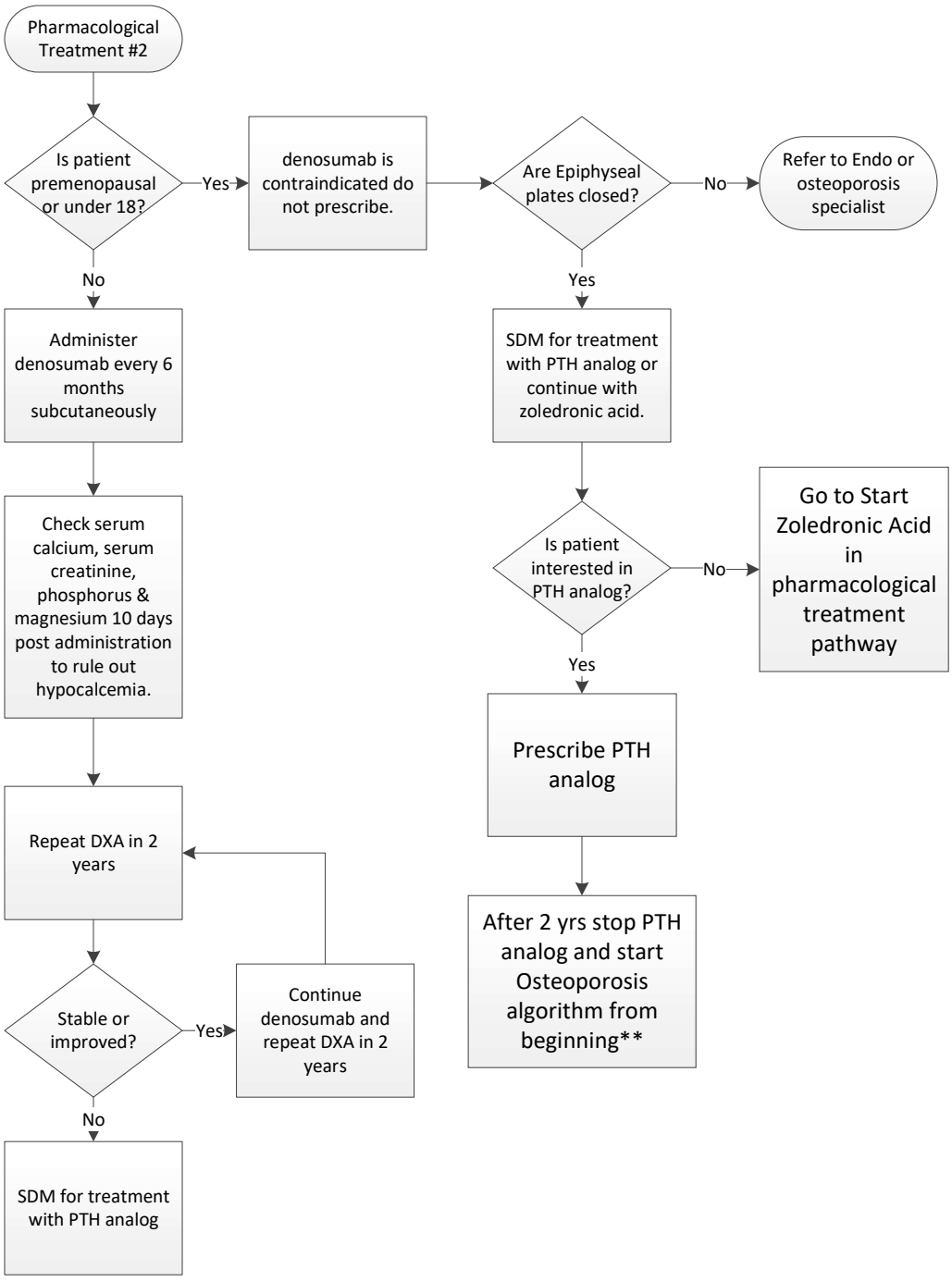

Osteopenia Treatment
High FRAX* or moderate FRAX and other menopausal symptoms?
no
Yes
High FRAX or Moderate FRAX
Moderate FRAX
High FRAX
Treat: See Osteoporosis Treatment pathway
Risk factors for HT?
Yes
no
Dietary and lifestyle changes **and** repeat DXA in 5 years
If patient not interested
If patient has diagnosis of osteopenia and other menopausal symptoms, consider post-menopausal hormone therapy
* High FRAX= Overall fracture risk ≥ 20% or hip fracture risk ≥ 3%
Moderate FRAX ≥ 10% to < 20%
** AACE 2020 guidelines


Lifestyle Changes
Patient has breast cancer?
Yes
Determine which team of experts manages Osteoporosis; Share clinical pathway
No
Prescribe Calcium, Vitamin D, and exericise; Also see dietary changes
Does patient smoke?
Advise not to use tobacco products, including e-cigarettes
Assess *Readiness to Change* related to tobacco cessation
Recommend stage appropriate lifestyle treatment and supports for smoking cessation
Stage appropriate education on smoking cessation
No
Does patient have a positive *Audit-C*?
Advise to decrease consumption of alcohol due to increased fall and fracture risk
Assess *Readiness to Change* related to alcohol consumption
Recommend stage appropriate lifestyle treatment and supports for reduced alcohol consumption
Stage appropriate education on decreasing alcohol consumption
No
Fall Risk Screening
High fall risk?
Yes
PT & OT assessment. Dietary & Lifestyle changes.
No
Dietary Changes


Pharmacological Treatment of Osteoporosis
GFR < 30?
Yes
Refer to Endo or Osteoporosis specialist
No
T score less than -3.5
yes
PTH Analog
Check Bone Markers 2 months post initiating Rx if checked at initial workup
DXA in 2 years
No
Yes
GI disorder? Esophageal disorder? Hx of Roux-En-Y? Can't sit upright 30+ mins or swallow pill?
No
Start the bisphosphonate Alendronate
Follow up in 6 months to eval compliance and how tolerating medication. Consider checking bone markers
Tolerate & compliant?
Yes
No
Change to oral risedronate (ACP 2017 guidelines)
No
Has patient failed 2 oral bisphosphonates ?
DXA in 2 yrs*
Yes
Start zoledronic acid**
Yes
No
Stable or improved?
Recheck DXA in 2 yrs
Yes
Stable or improved?
Yes
Continue for total of 5yrs. Then recheck DXA
No
Shared decision making for Rx of denosumab, or cont. zoledronic acid
No
Stable or improved?
Yes
No
Patient chooses denosumab?
Yes
Pharmacological Treatment #2
Initial BMD ≤-3.5?
No
Drug holiday 2yrs and recheck DXA
Yes
No drug holiday. Continue treatment and recheck DXA in 2yrs
Stable or improved?
No
Yes
Restart previous treatment
Don't restart medication. Repeat DXA in 2 yrs.


Pharmacological Treatment #2
Is patient premenopausal or under 18?
Yes
denosumab is contraindicated do not prescribe.
Are Epiphyseal plates closed?
No
Refer to Endo or osteoporosis specialist
No
Yes
Administer denosumab every 6 months subcutaneously
SDM for treatment with PTH analog or continue with zoledronic acid.
Check serum calcium, serum creatinine, phosphorus & magnesium 10 days post administration to rule out hypocalcemia.
Is patient interested in PTH analog?
No
Go to Start Zoledronic Acid in pharmacological treatment pathway
Yes
Prescribe PTH analog
Repeat DXA in 2 years
After 2 yrs stop PTH analog and start Osteoporosis algorithm from beginning**
Stable or improved?
Yes
Continue denosumab and repeat DXA in 2 years
No
SDM for treatment with PTH analog