CONCORD INTERNAL MEDICINE

CHRONIC KIDNEY DISEASE PROTOCOL

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The information contained in this protocol should never be used as a substitute for clinical judgment.

The Clinician and the patient need to develop an individual treatment plan tailored to the specific needs and circumstances of the patient.

Chronic Kidney Disease Protocol

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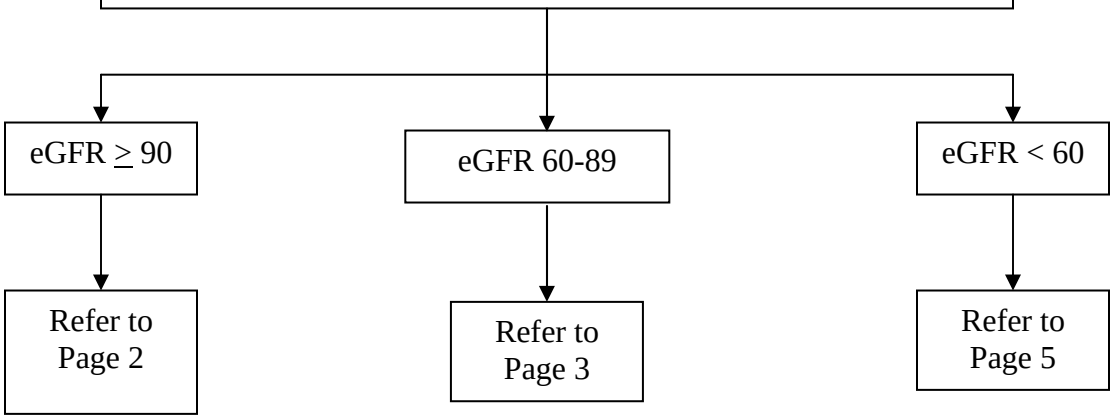
Screening for Chronic Kidney Disease (CKD)

Measure serum creatinine to estimate GFR (eGFR) in all patients who are at risk for CKD including diabetes, hypertension, autoimmune diseases (such as systemic lupus erythematosus), recurrent UTI's, recurrent kidney stones, family history of CKD, older age (≥60), ethnic minorities, (such as African American, American Indians, Hispanic or Latino, Asian or Pacific Islanders), history of acute renal failure, daily NSAID use, evidence of kidney damage, such as albuminuria (A/C ratio ≥ 17 (men) and ≥ 25 (women) except for diabetes A/C ratio ≥ 30 with regard for gender), hematuria, pyuria with casts and without active UTI, renal tubular acidism, nephrogenic diabetes insipidus, etc.



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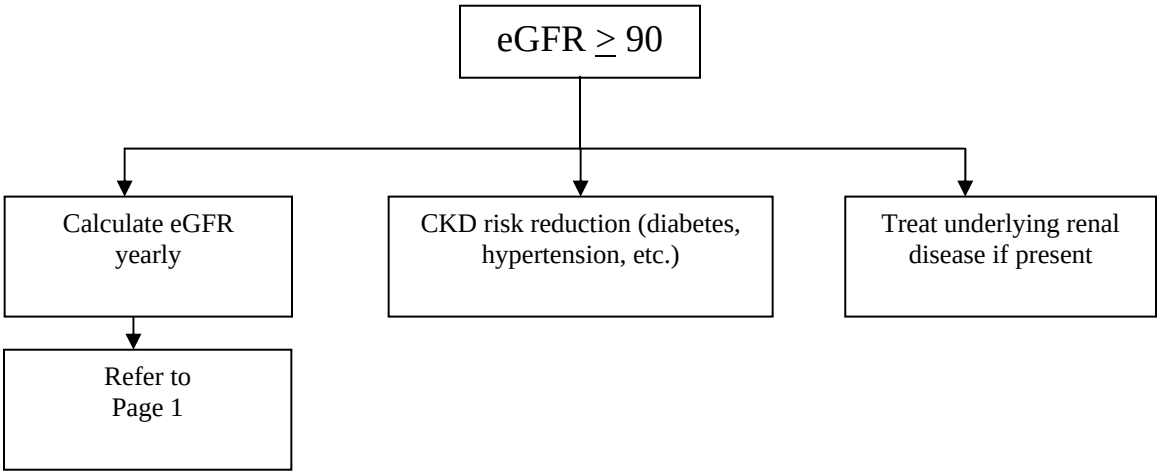
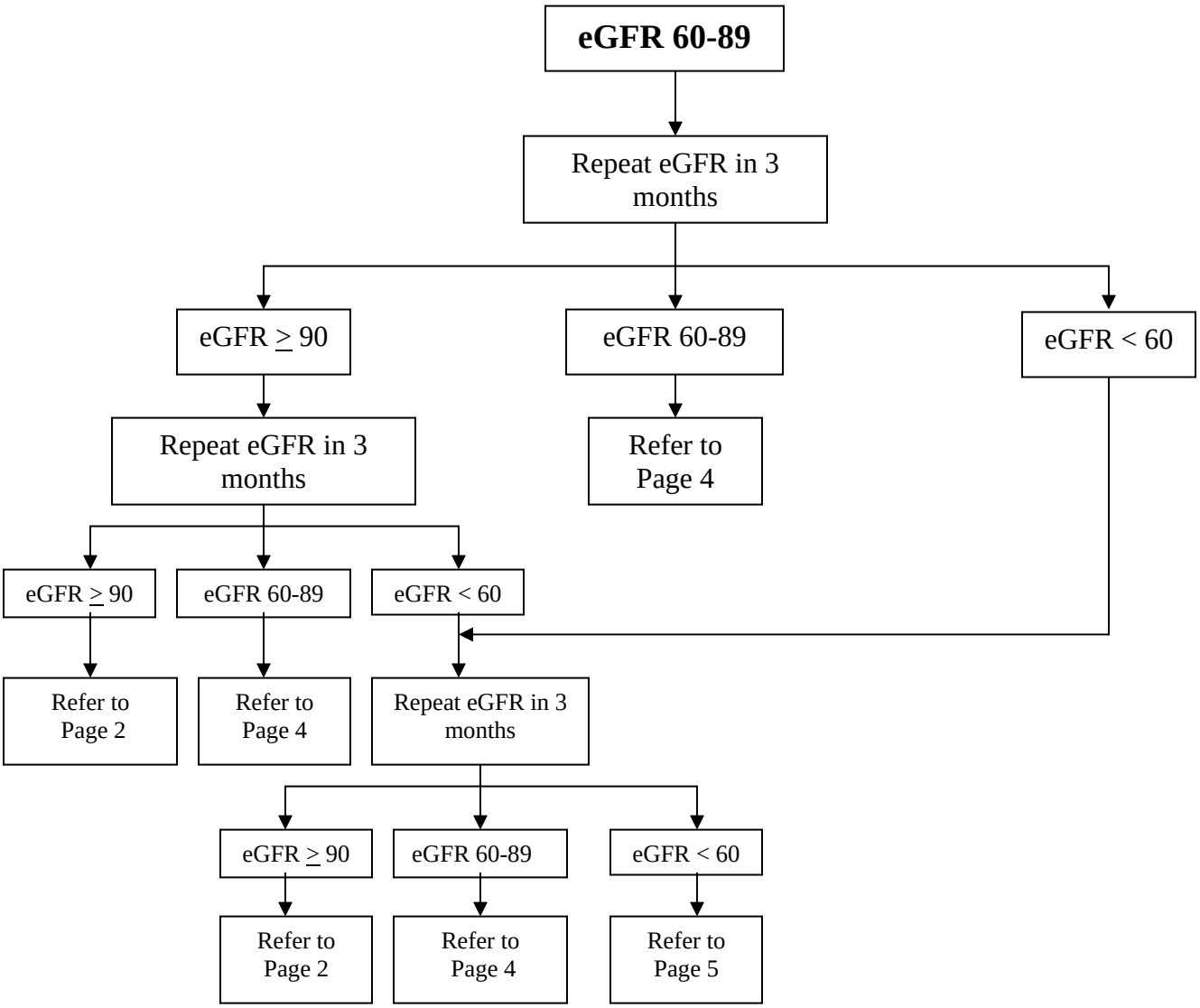
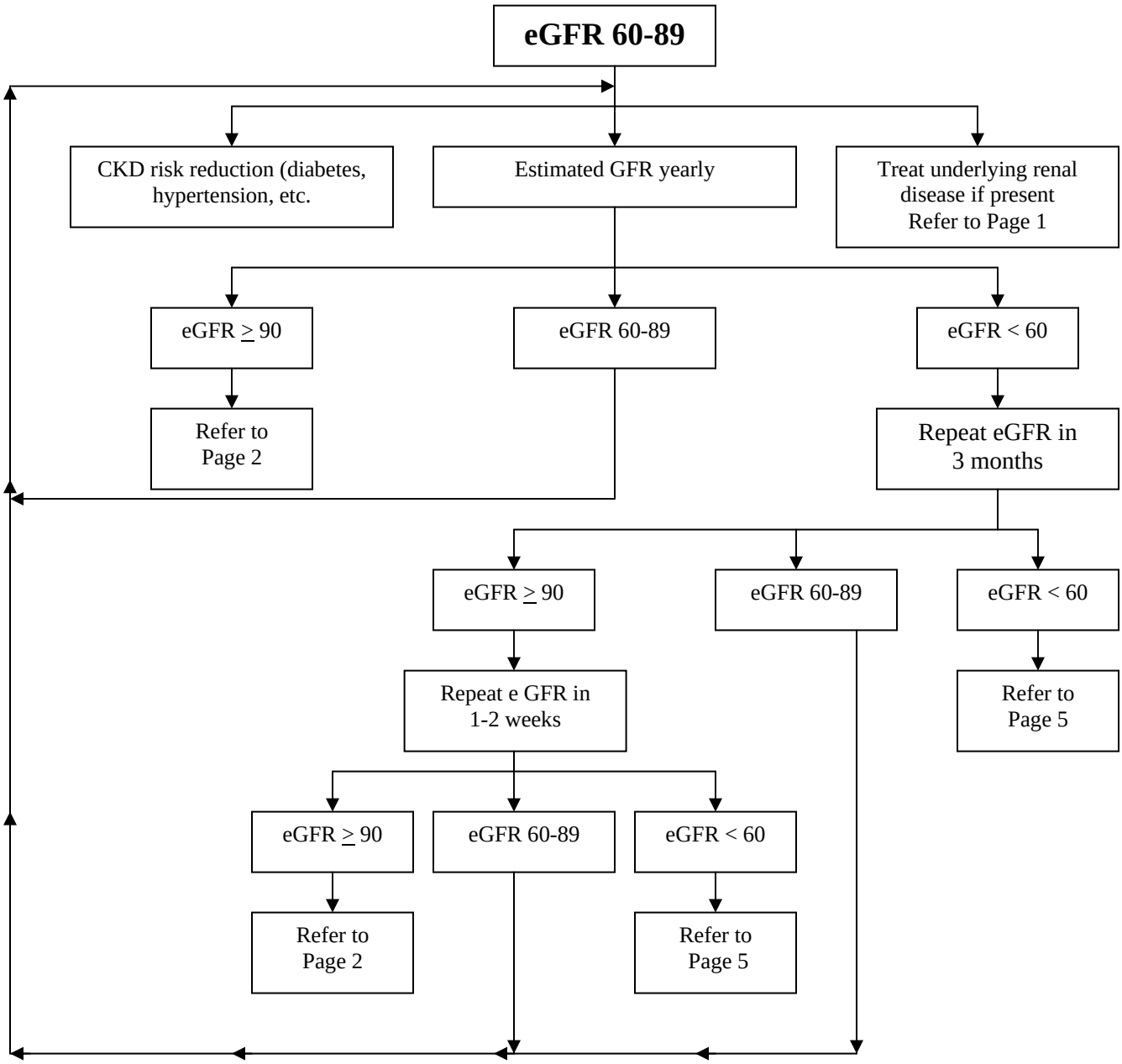
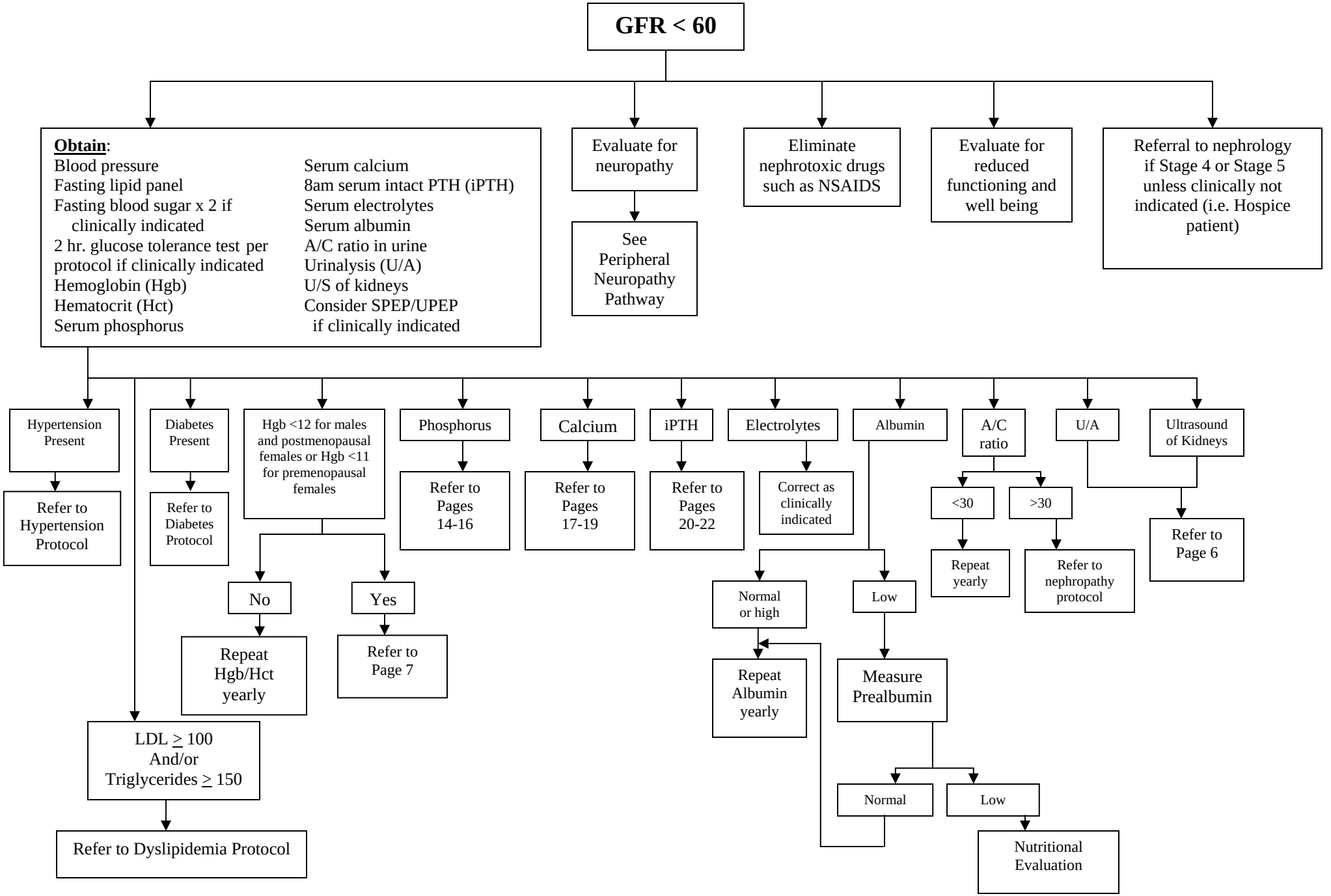
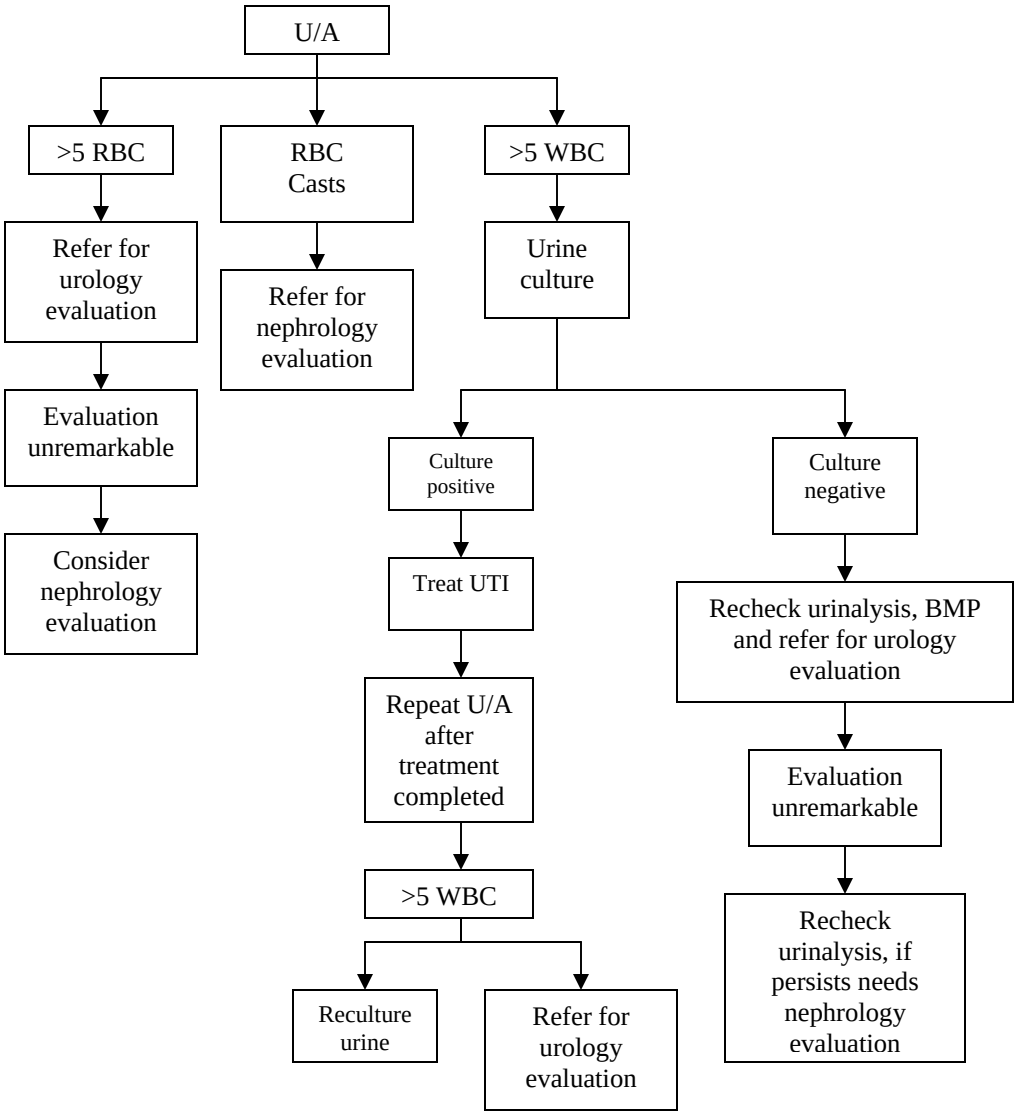

eGFR ≥ 90
Calculate eGFR yearly
CKD risk reduction (diabetes, hypertension, etc.)
Treat underlying renal disease if present
Refer to Page 1

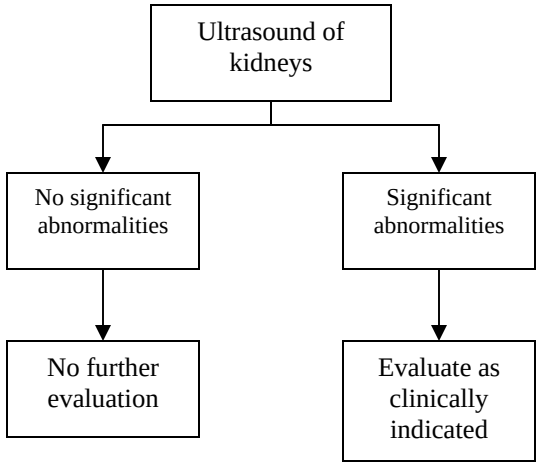

eGFR 60-89
Repeat eGFR in 3 months
eGFR ≥ 90
eGFR 60-89
eGFR < 60
Repeat eGFR in 3 months
Refer to Page 4
eGFR ≥ 90
eGFR 60-89
eGFR < 60
Refer to Page 2
Refer to Page 4
Repeat eGFR in 3 months
eGFR ≥ 90
eGFR 60-89
eGFR < 60
Refer to Page 2
Refer to Page 4
Refer to Page 5

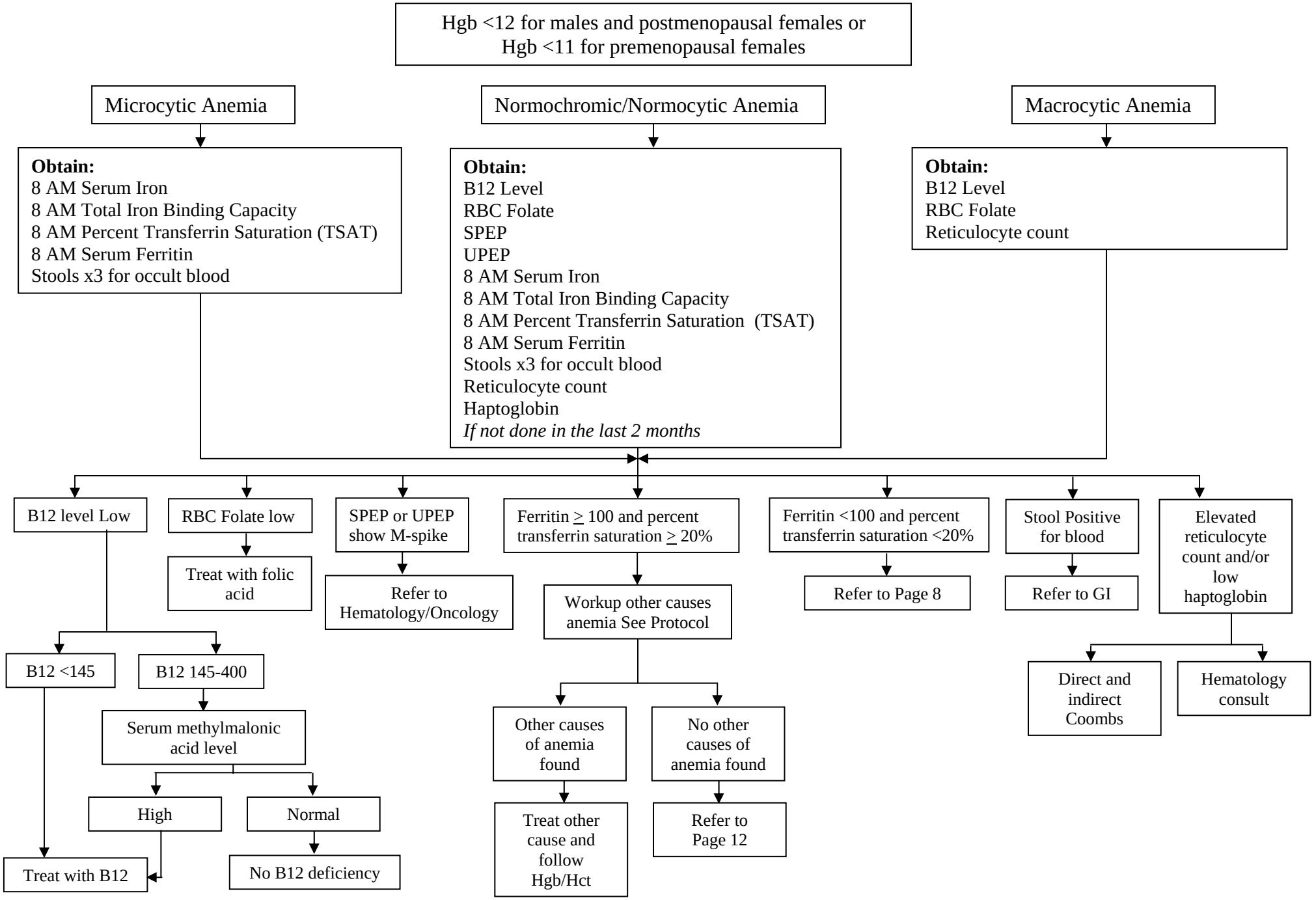

eGFR 60-89
CKD risk reduction (diabetes, hypertension, etc.
Estimated GFR yearly
Treat underlying renal disease if present
Refer to Page 1
eGFR ≥ 90
eGFR 60-89
eGFR < 60
Refer to Page 2
Repeat eGFR in 3 months
eGFR ≥ 90
eGFR 60-89
eGFR < 60
Repeat e GFR in 1-2 weeks
Refer to Page 5
eGFR ≥ 90
eGFR 60-89
eGFR < 60
Refer to Page 2
Refer to Page 5


GFR < 60
Obtain:
Blood pressure
Fasting lipid panel
Fasting blood sugar x 2 if clinically indicated
2 hr. glucose tolerance test per protocol if clinically indicated
Hemoglobin (Hgb)
Hematocrit (Hct)
Serum phosphorus
Serum calcium
8am serum intact PTH (iPTH)
Serum electrolytes
Serum albumin
A/C ratio in urine
Urinalysis (U/A)
U/S of kidneys
Consider SPEP/UPEP if clinically indicated
Evaluate for neuropathy
See Peripheral Neuropathy Pathway
Eliminate nephrotoxic drugs such as NSAIDS
Evaluate for reduced functioning and well being
Referral to nephrology if Stage 4 or Stage 5 unless clinically not indicated (i.e. Hospice patient)
Hypertension Present
Refer to Hypertension Protocol
Diabetes Present
Refer to Diabetes Protocol
Hgb <12 for males and postmenopausal females or Hgb <11 for premenopausal females
No
Repeat Hgb/Hct yearly
Yes
Refer to Page 7
Phosphorus
Refer to Pages 14-16
Calcium
Refer to Pages 17-19
iPTH
Refer to Pages 20-22
Electrolytes
Correct as clinically indicated
Albumin
Normal or high
Repeat Albumin yearly
Low
Measure Prealbumin
Normal
Low
Nutritional Evaluation
A/C ratio
<30
Repeat yearly
>30
Refer to nephropathy protocol
U/A
Ultrasound of Kidneys
Refer to Page 6
LDL ≥ 100
And/or
Triglycerides ≥ 150
Refer to Dyslipidemia Protocol

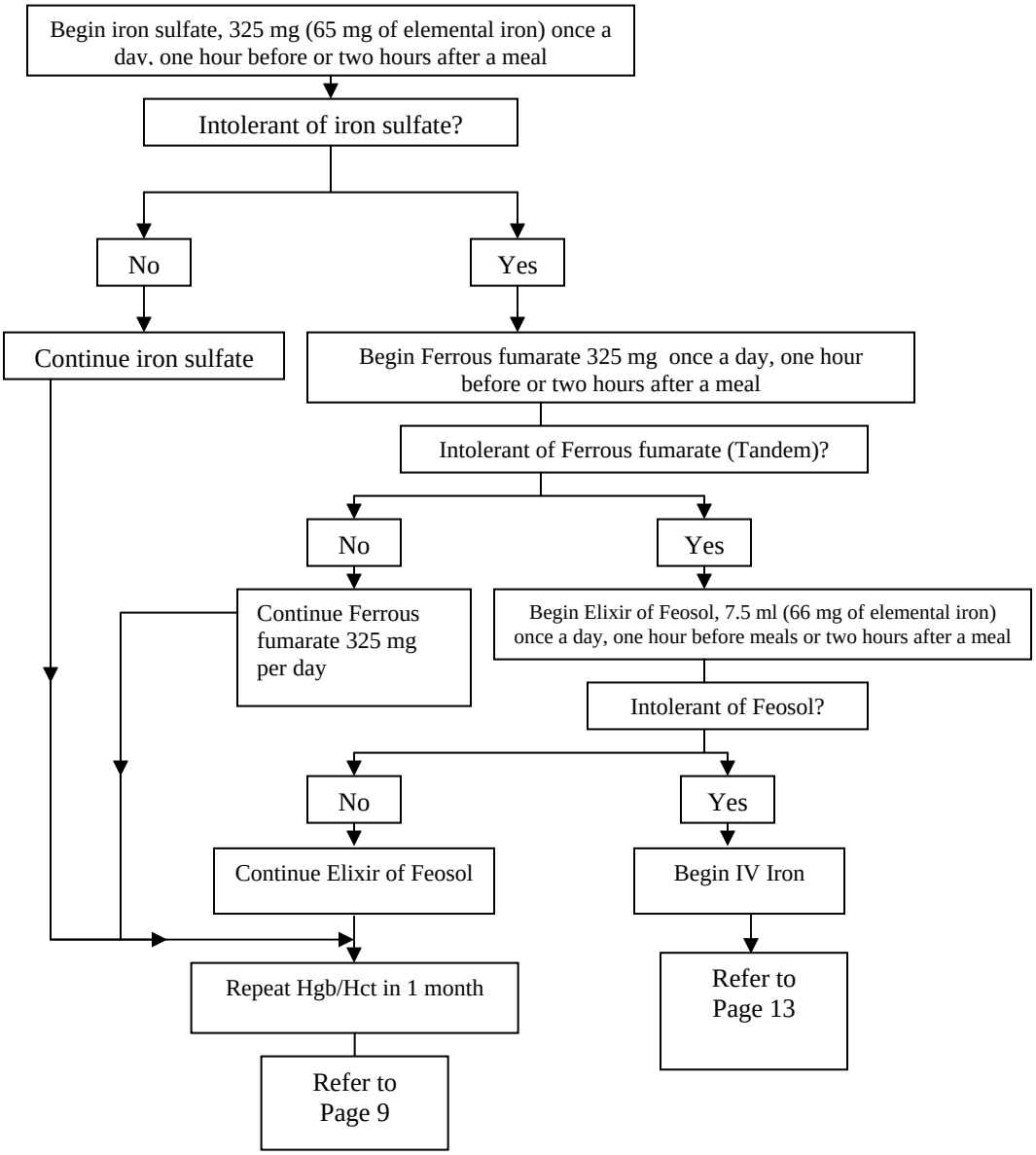
U/A and ultrasound of kidneys

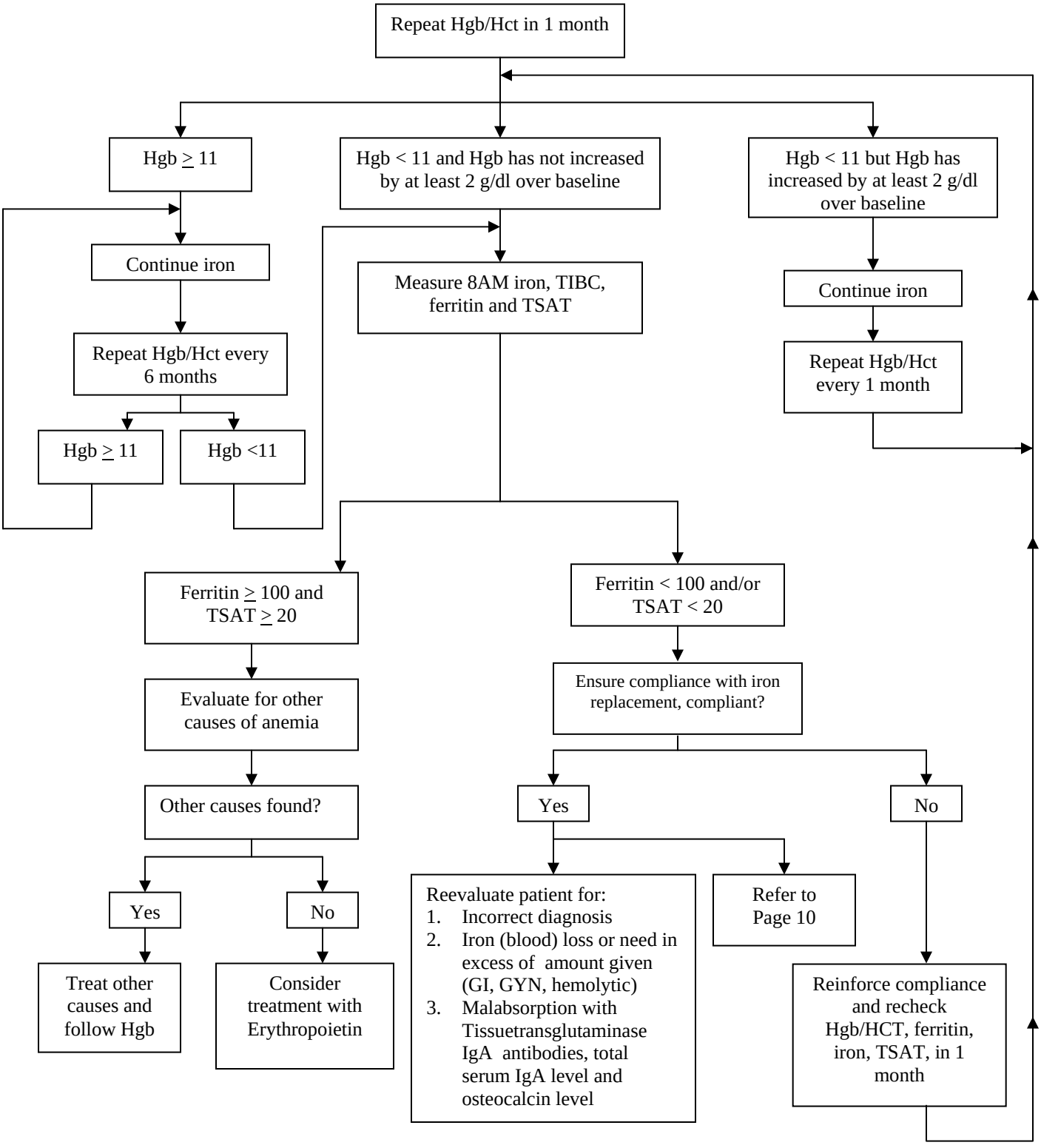


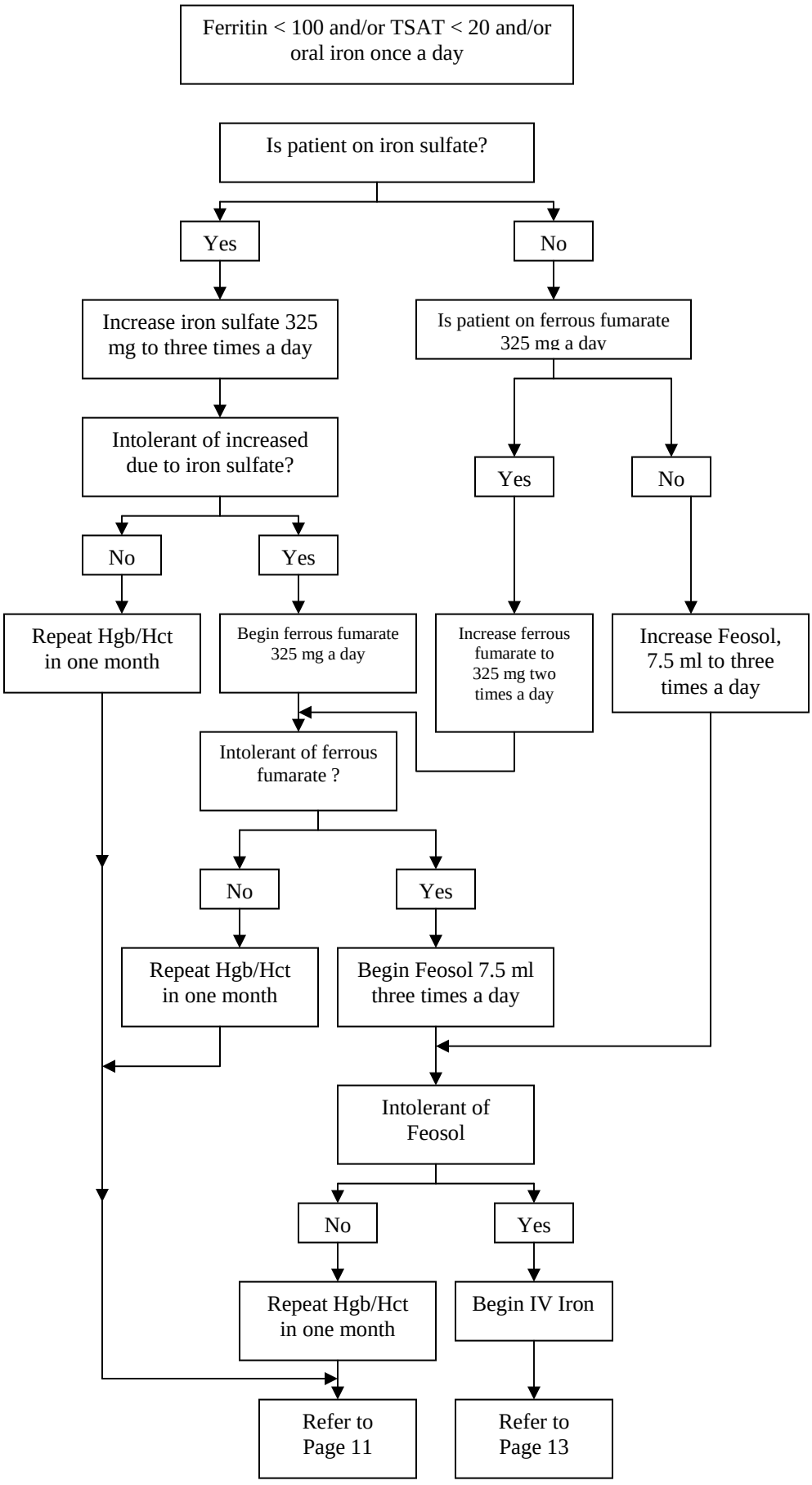


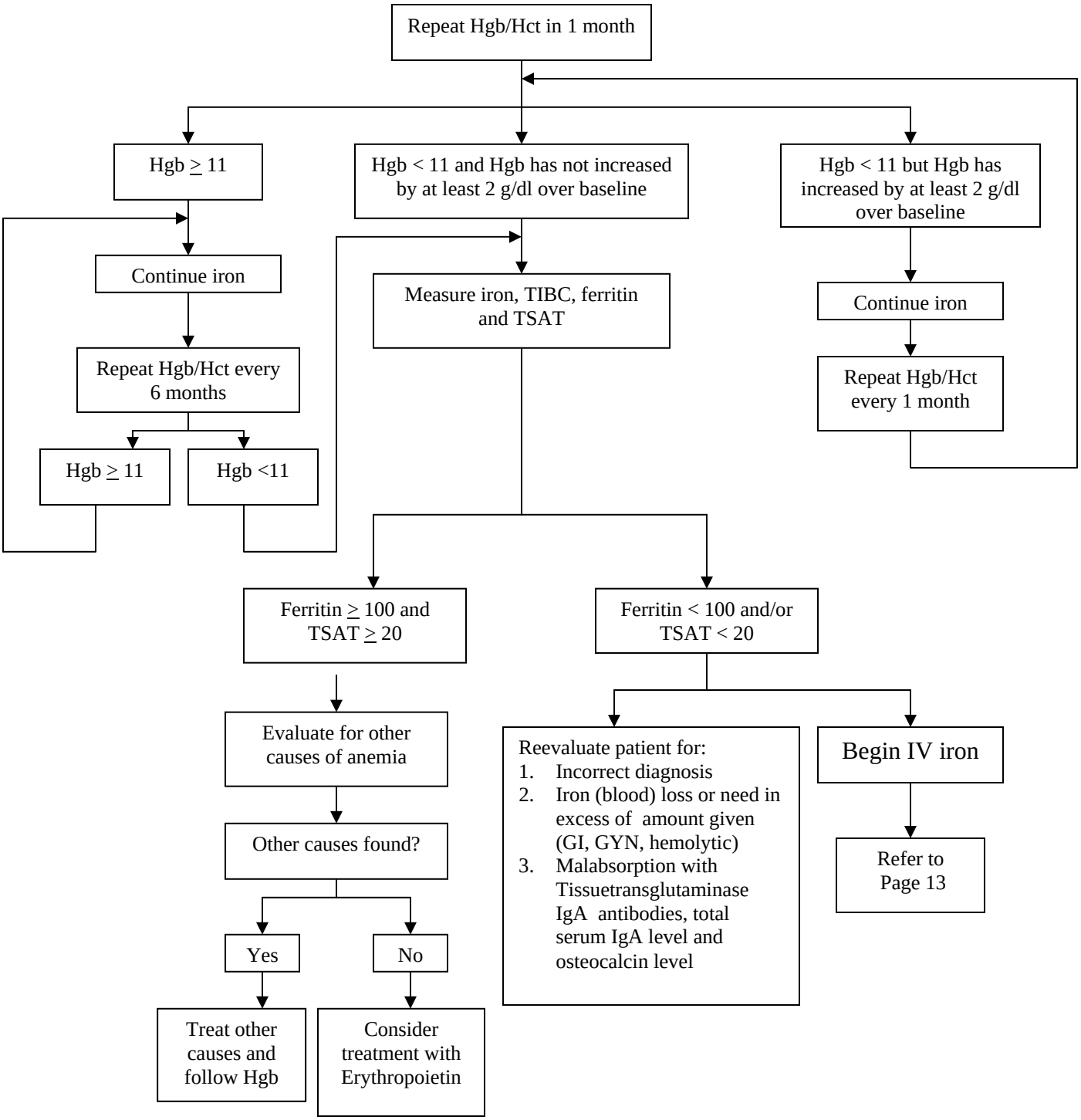

Hgb <12 for males and postmenopausal females or
Hgb <11 for premenopausal females
Microcytic Anemia
Normochromic/Normocytic Anemia
Macrocytic Anemia
Obtain:
8 AM Serum Iron
8 AM Total Iron Binding Capacity
8 AM Percent Transferrin Saturation (TSAT)
8 AM Serum Ferritin
Stools x3 for occult blood
Obtain:
B12 Level
RBC Folate
SPEP
UPEP
8 AM Serum Iron
8 AM Total Iron Binding Capacity
8 AM Percent Transferrin Saturation (TSAT)
8 AM Serum Ferritin
Stools x3 for occult blood
Reticulocyte count
Haptoglobin
If not done in the last 2 months
Obtain:
B12 Level
RBC Folate
Reticulocyte count
B12 level Low
RBC Folate low
SPEP or UPEP show M-spike
Ferritin ≥ 100 and percent transferrin saturation ≥ 20%
Ferritin <100 and percent transferrin saturation <20%
Stool Positive for blood
Elevated reticulocyte count and/or low haptoglobin
Treat with folic acid
Refer to Hematology/Oncology
Workup other causes anemia See Protocol
Refer to Page 8
Refer to GI
B12 <145
B12 145-400
Serum methylmalonic acid level
High
Normal
Treat with B12
No B12 deficiency
Other causes of anemia found
No other causes of anemia found
Treat other cause and follow Hgb/Hct
Refer to Page 12
Direct and indirect Coombs
Hematology consult

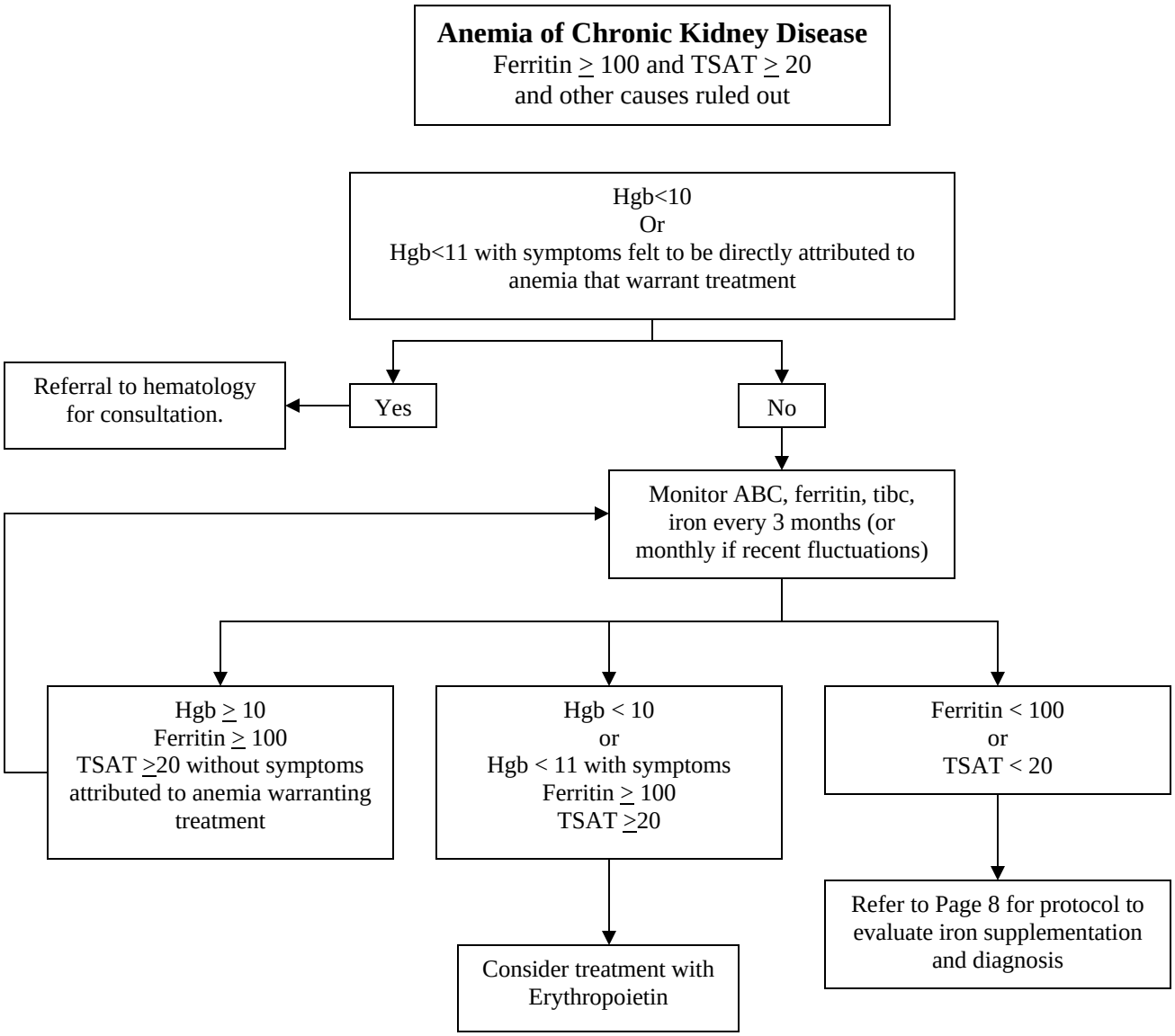
Oral Iron Therapy



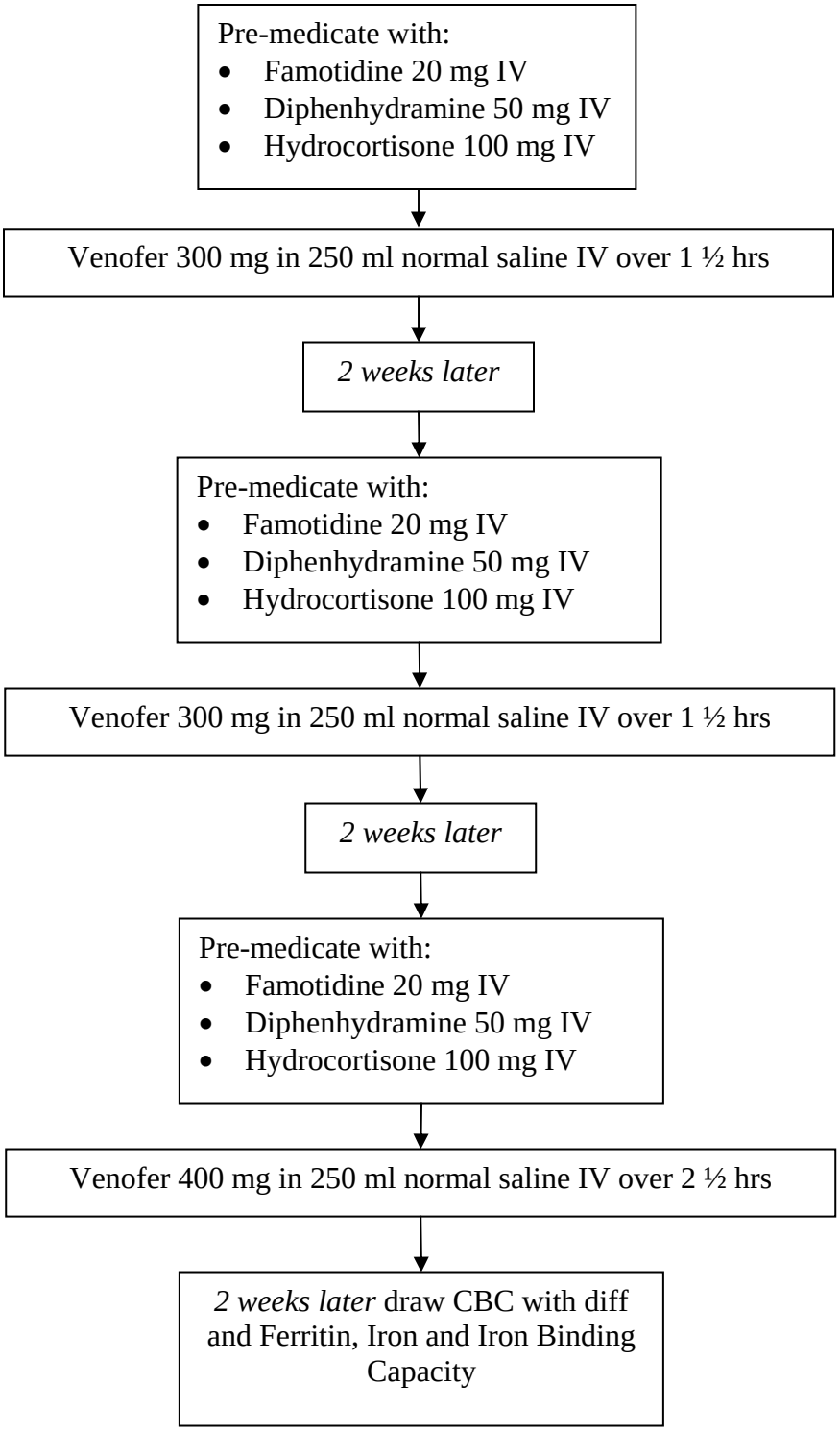

Repeat Hgb/Hct in 1 month
Hgb ≥ 11
Hgb < 11 and Hgb has not increased by at least 2 g/dl over baseline
Hgb < 11 but Hgb has increased by at least 2 g/dl over baseline
Continue iron
Measure 8AM iron, TIBC, ferritin and TSAT
Continue iron
Repeat Hgb/Hct every 6 months
Repeat Hgb/Hct every 1 month
Hgb ≥ 11
Hgb <11
Ferritin ≥ 100 and TSAT ≥ 20
Ferritin < 100 and/or TSAT < 20
Evaluate for other causes of anemia
Ensure compliance with iron replacement, compliant?
Other causes found?
Yes
No
Yes
No
Treat other causes and follow Hgb
Consider treatment with Erythropoietin
Reevaluate patient for:
1. Incorrect diagnosis
2. Iron (blood) loss or need in excess of amount given (GI, GYN, hemolytic)
3. Malabsorption with Tissuetransglutaminase IgA antibodies, total serum IgA level and osteocalcin level
Refer to Page 10
Reinforce compliance and recheck Hgb/HCT, ferritin, iron, TSAT, in 1 month

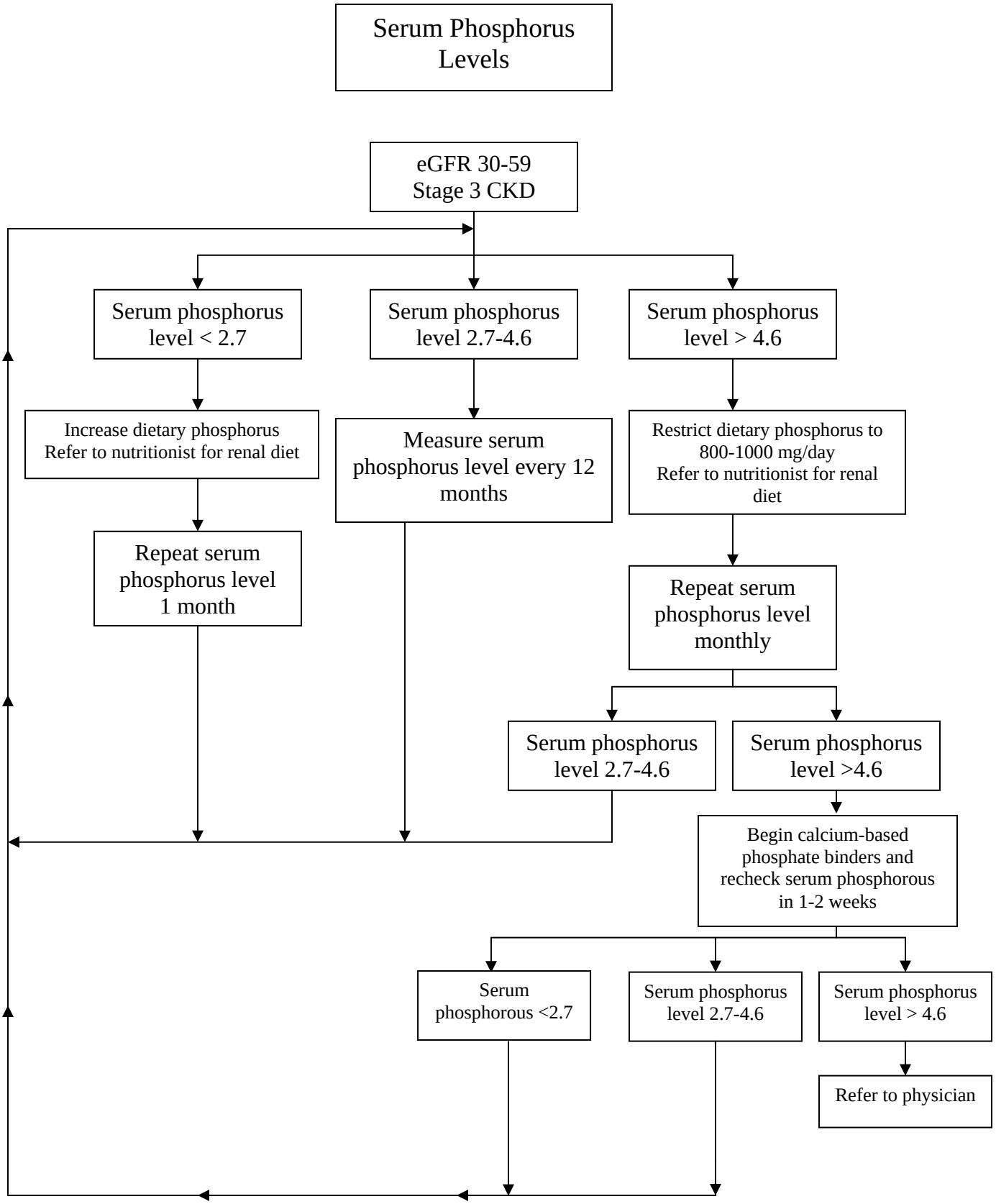

Ferritin < 100 and/or TSAT < 20 and/or oral iron once a day
Is patient on iron sulfate?
Yes
No
Increase iron sulfate 325 mg to three times a day
Is patient on ferrous fumarate 325 mg a day
Intolerant of increased due to iron sulfate?
Yes
No
No
Yes
Repeat Hgb/Hct in one month
Begin ferrous fumarate 325 mg a day
Increase ferrous fumarate to 325 mg two times a day
Increase Feosol, 7.5 ml to three times a day
Intolerant of ferrous fumarate ?
No
Yes
Repeat Hgb/Hct in one month
Begin Feosol 7.5 ml three times a day
Intolerant of Feosol
No
Yes
Repeat Hgb/Hct in one month
Begin IV Iron
Refer to Page 11
Refer to Page 13


Repeat Hgb/Hct in 1 month
Hgb ≥ 11
Hgb < 11 and Hgb has not increased by at least 2 g/dl over baseline
Hgb < 11 but Hgb has increased by at least 2 g/dl over baseline
Continue iron
Measure iron, TIBC, ferritin and TSAT
Continue iron
Repeat Hgb/Hct every 6 months
Repeat Hgb/Hct every 1 month
Hgb ≥ 11
Hgb <11
Ferritin ≥ 100 and TSAT ≥ 20
Ferritin < 100 and/or TSAT < 20
Evaluate for other causes of anemia
Reevaluate patient for:
1. Incorrect diagnosis
2. Iron (blood) loss or need in excess of amount given (GI, GYN, hemolytic)
3. Malabsorption with Tissuetransglutaminase IgA antibodies, total serum IgA level and osteocalcin level
Begin IV iron
Other causes found?
Refer to Page 13
Yes
No
Treat other causes and follow Hgb
Consider treatment with Erythropoietin

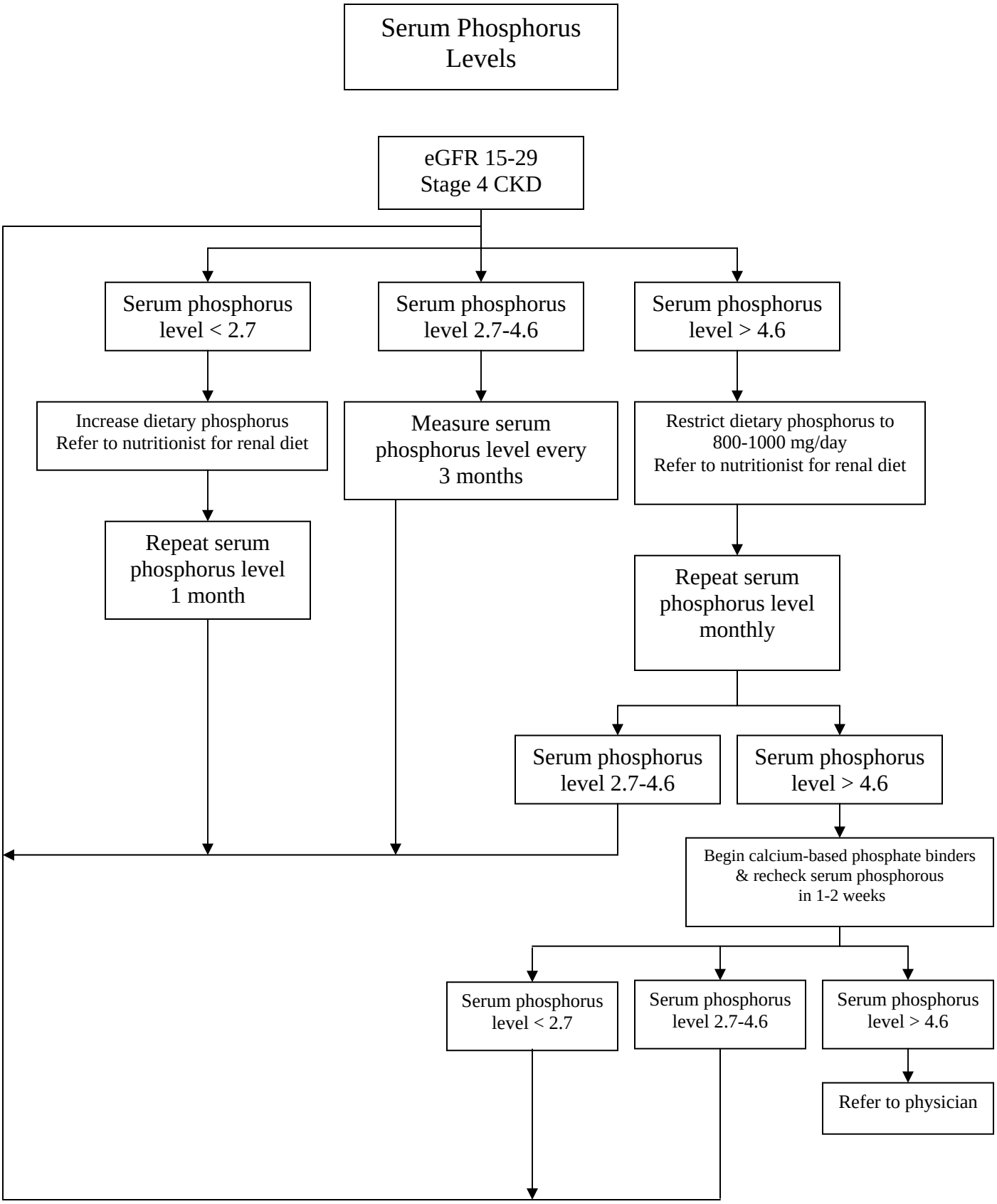

Anemia of Chronic Kidney Disease
Ferritin ≥ 100 and TSAT ≥ 20
and other causes ruled out
Hgb<10
Or
Hgb<11 with symptoms felt to be directly attributed to anemia that warrant treatment
Referral to hematology for consultation.
Yes
No
Monitor ABC, ferritin, tibc, iron every 3 months (or monthly if recent fluctuations)
Hgb ≥ 10
Ferritin ≥ 100
TSAT ≥20 without symptoms attributed to anemia warranting treatment
Hgb < 10
or
Hgb < 11 with symptoms
Ferritin ≥ 100
TSAT ≥20
Ferritin < 100
or
TSAT < 20
Consider treatment with Erythropoietin
Refer to Page 8 for protocol to evaluate iron supplementation and diagnosis

VENOFER PROTOCOL

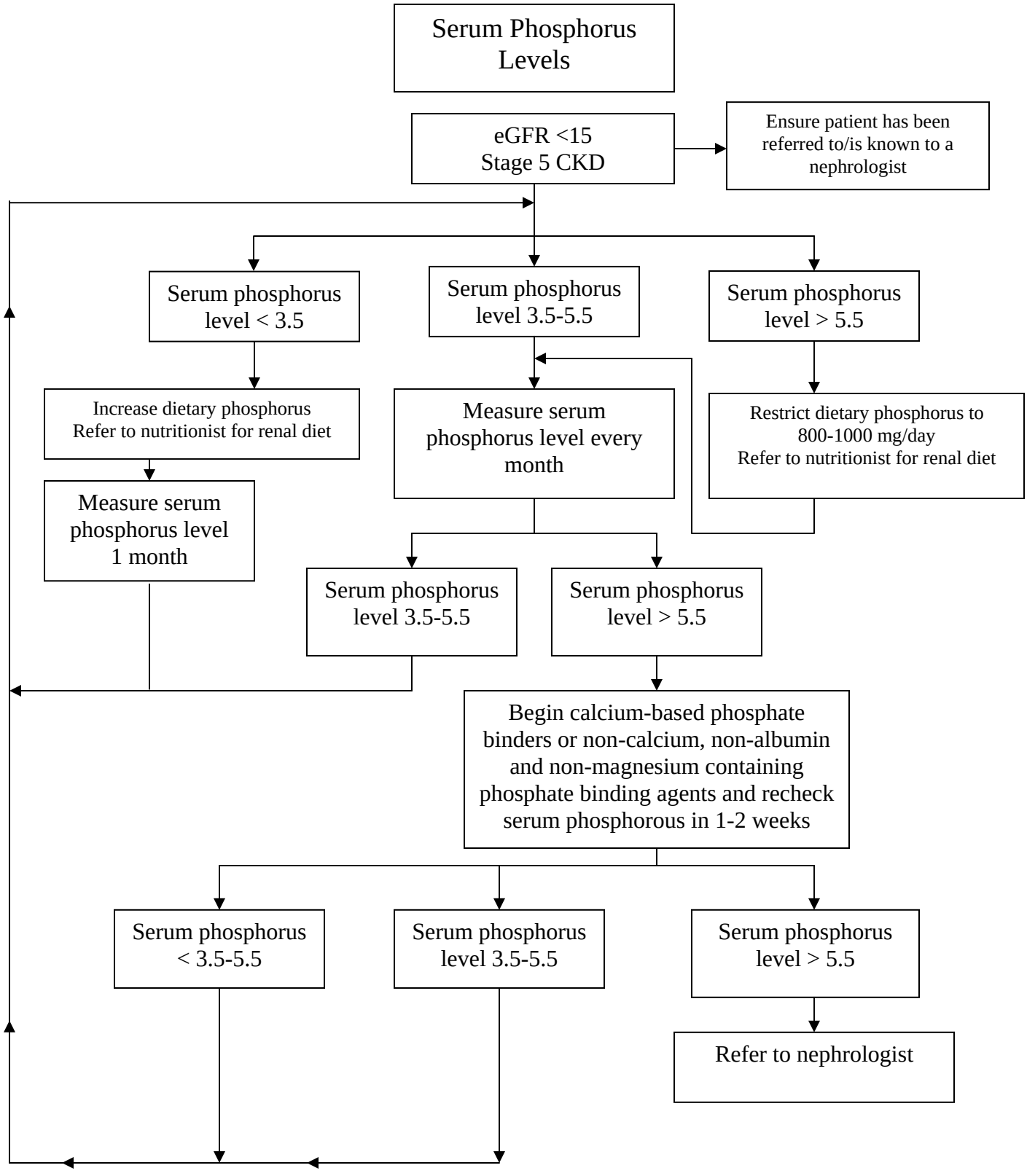




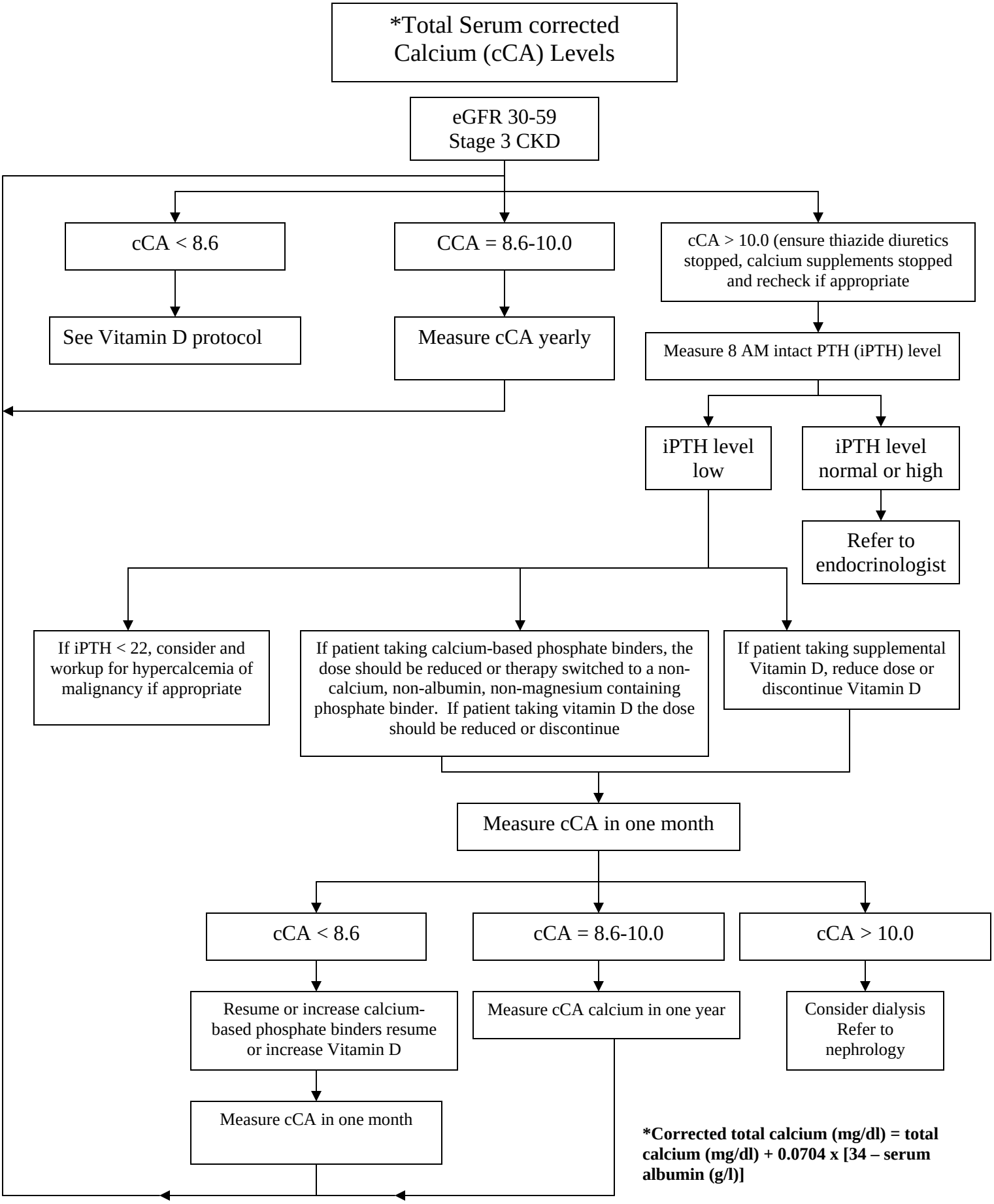
***Keep calcium phosphorus product < 55 mg 2/dl^2**



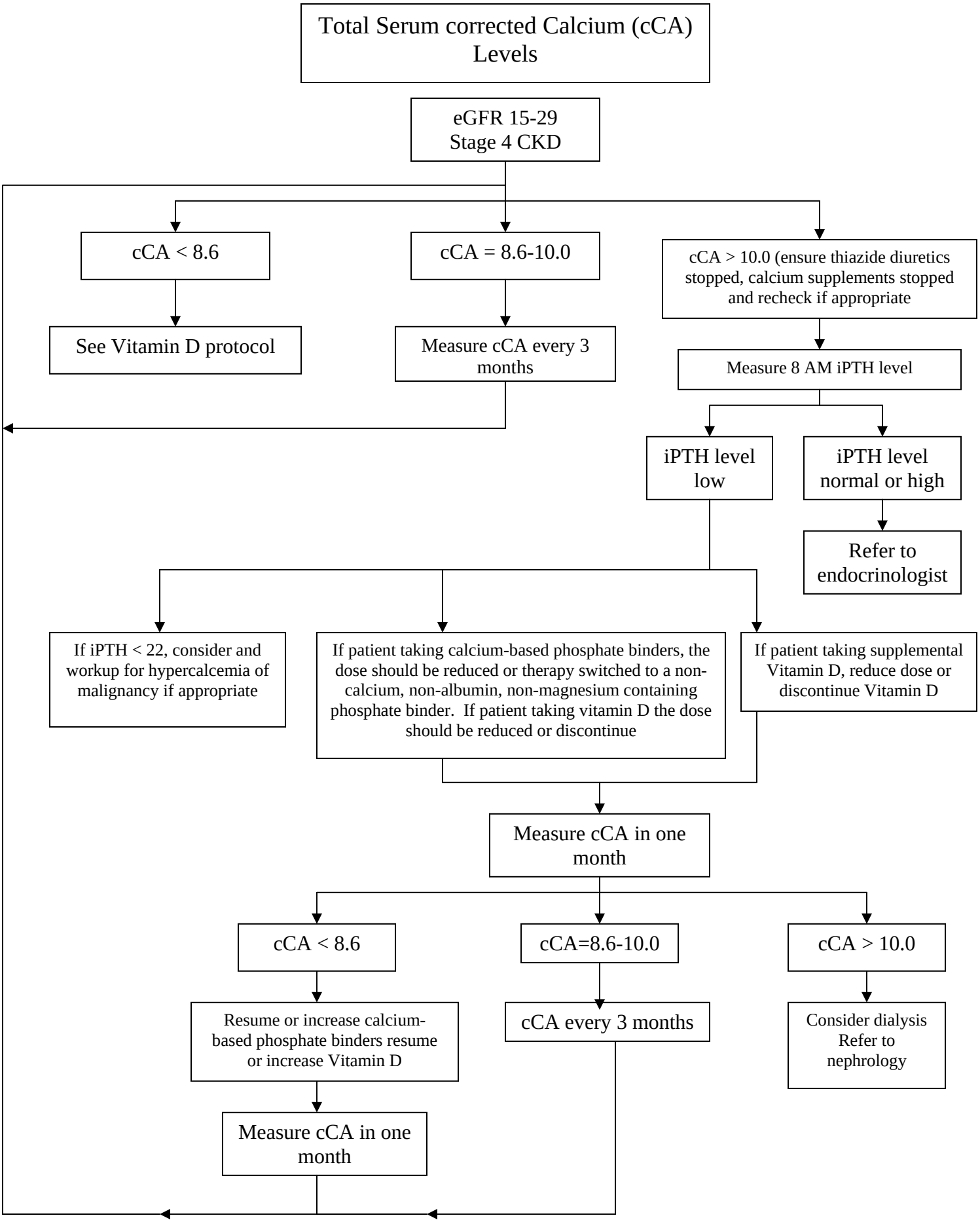
***Keep calcium phosphorus product < 55 mg 2/dl[2]**

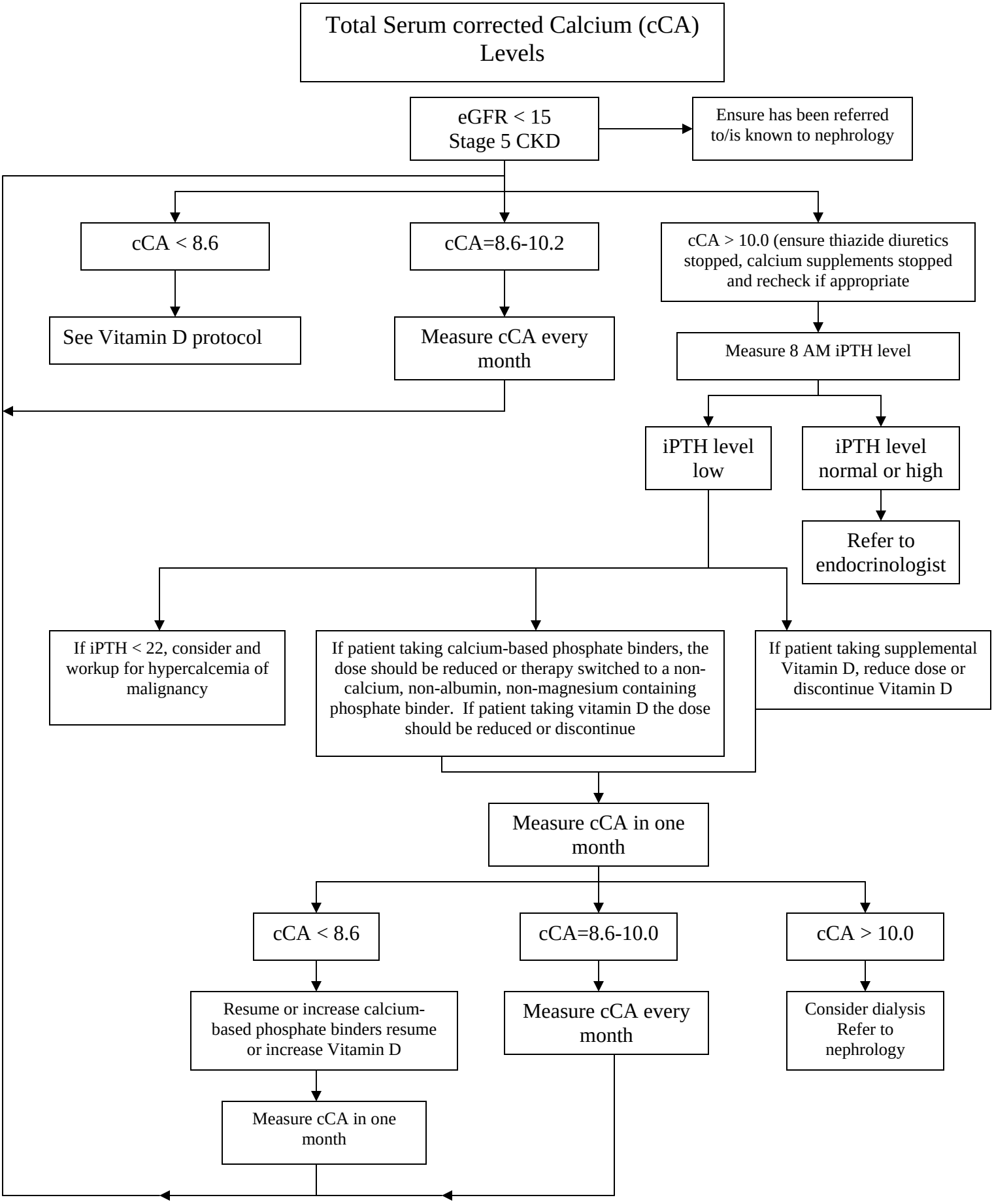


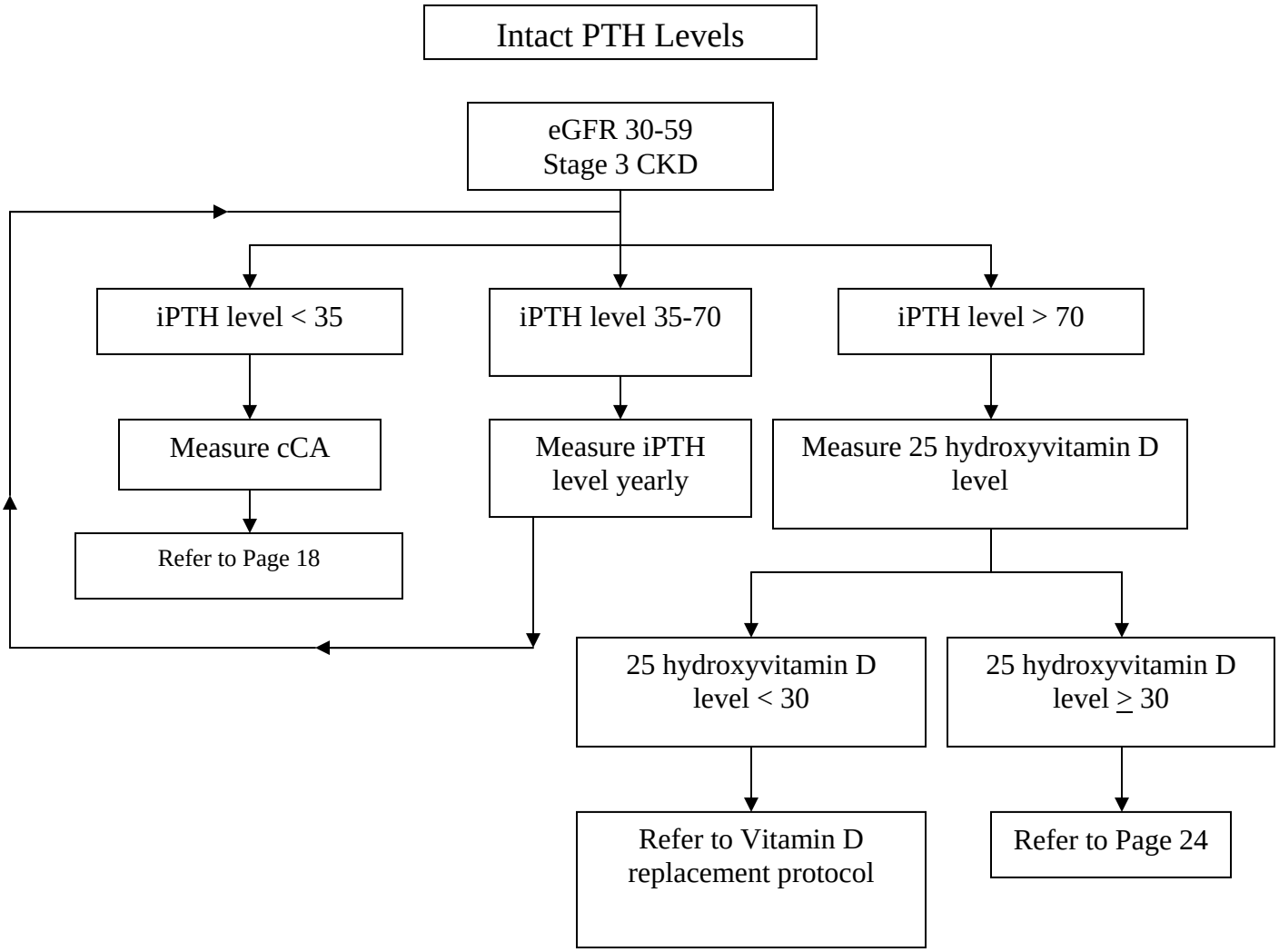
***Keep calcium phosphorus product < 55 mg 2/dl[2]**

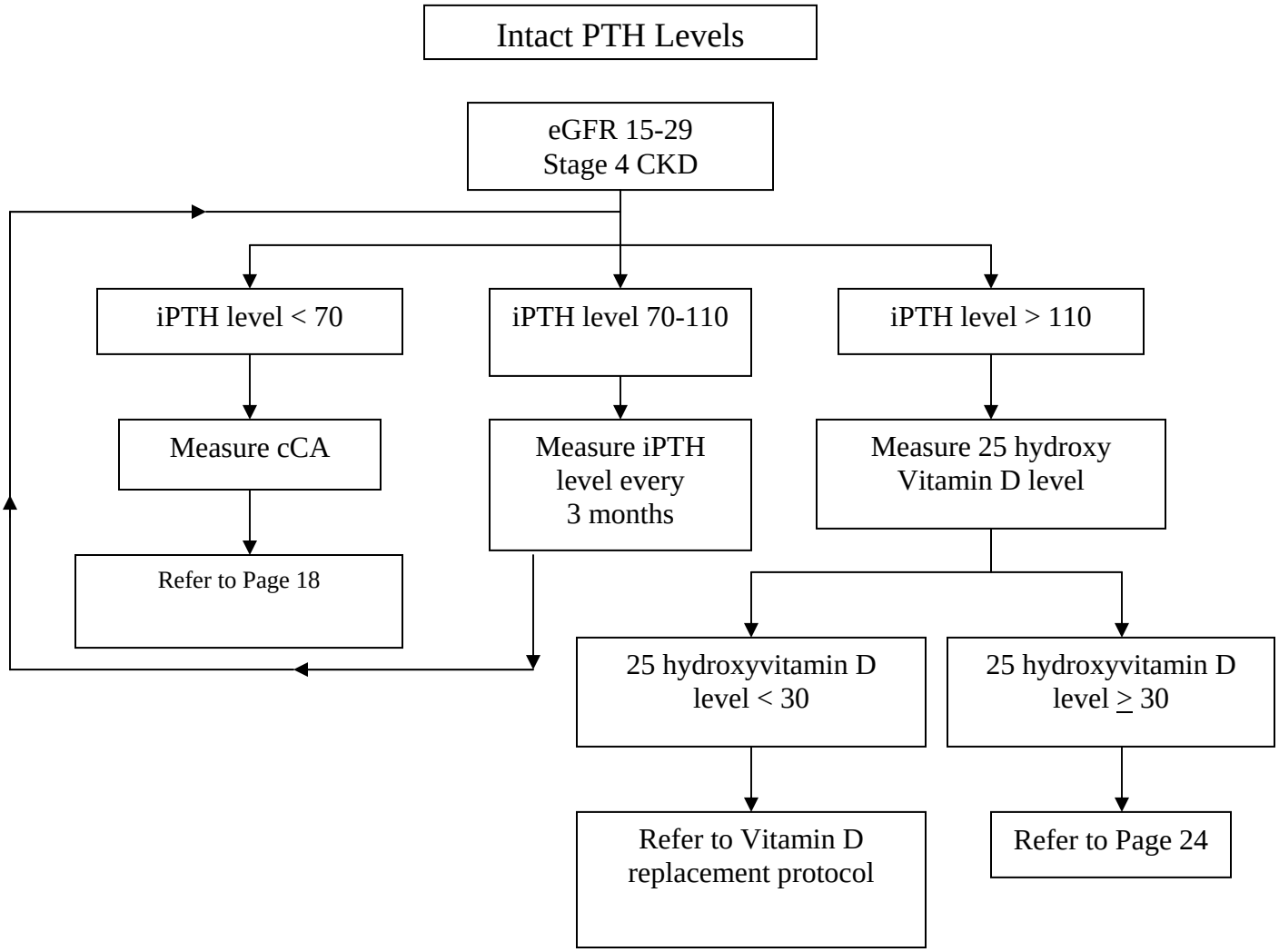


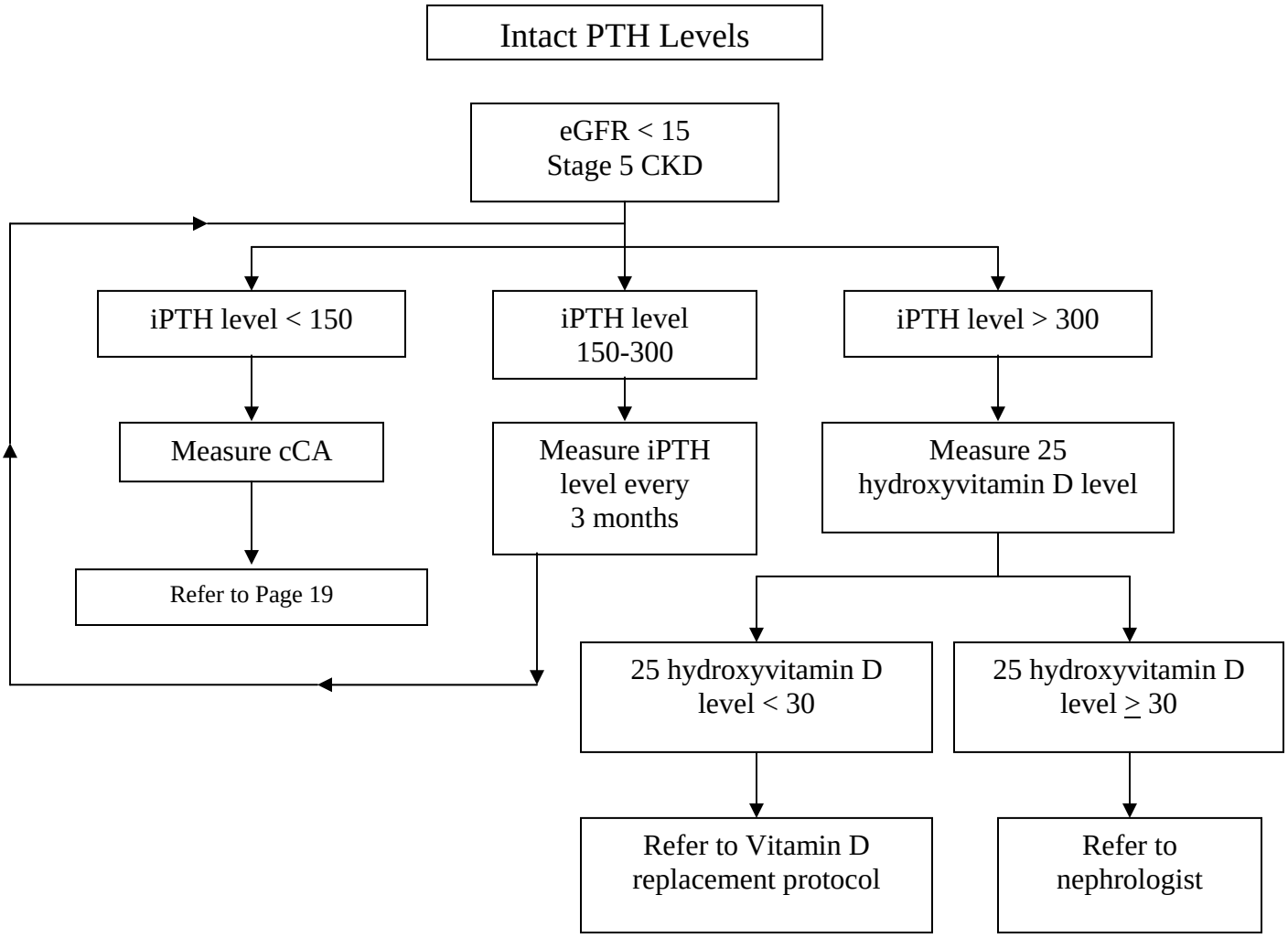
***Corrected total calcium (mg/dl) = total calcium (mg/dl) + 0.0704 x [34 – serum albumin (g/l)]**

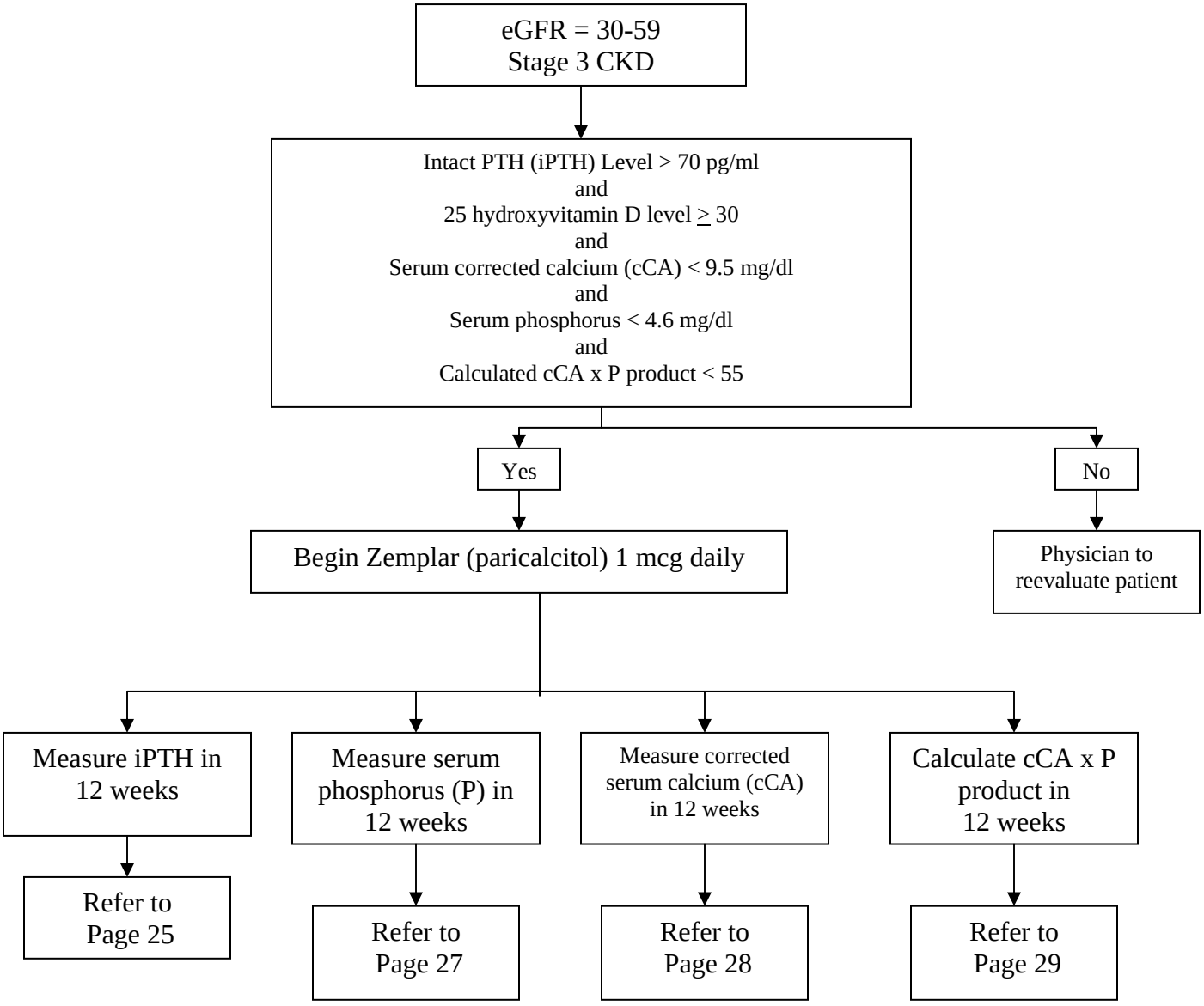

Total Serum corrected Calcium (cCA) Levels
eGFR 15-29 Stage 4 CKD
cCA < 8.6
cCA = 8.6-10.0
cCA > 10.0 (ensure thiazide diuretics stopped, calcium supplements stopped and recheck if appropriate
See Vitamin D protocol
Measure cCA every 3 months
Measure 8 AM iPTH level
iPTH level low
iPTH level normal or high
Refer to endocrinologist
If iPTH < 22, consider and workup for hypercalcemia of malignancy if appropriate
If patient taking calcium-based phosphate binders, the dose should be reduced or therapy switched to a non-calcium, non-albumin, non-magnesium containing phosphate binder. If patient taking vitamin D the dose should be reduced or discontinue
If patient taking supplemental Vitamin D, reduce dose or discontinue Vitamin D
Measure cCA in one month
cCA < 8.6
cCA=8.6-10.0
cCA > 10.0
Resume or increase calcium-based phosphate binders resume or increase Vitamin D
cCA every 3 months
Consider dialysis Refer to nephrology
Measure cCA in one month

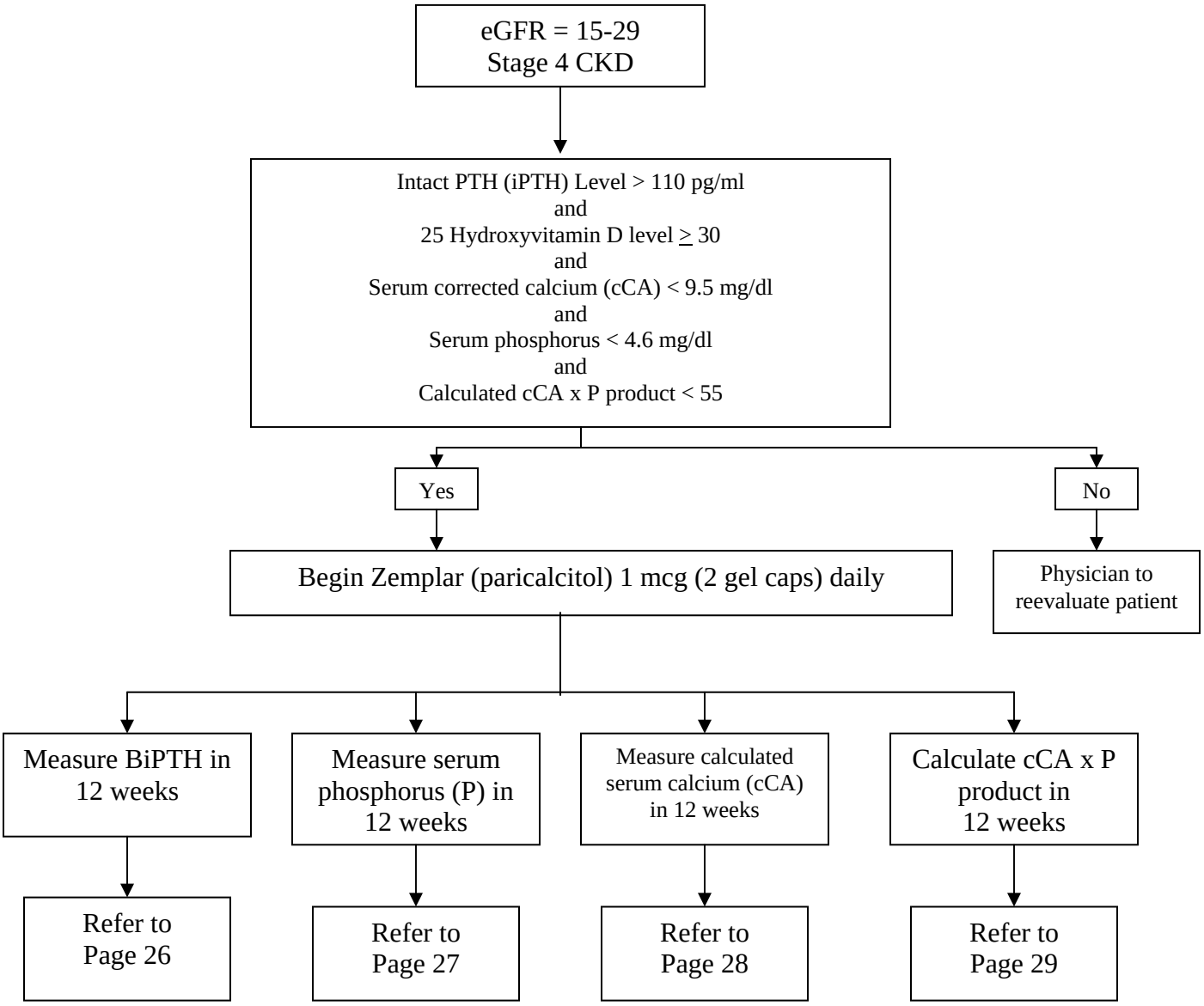

Total Serum corrected Calcium (cCA) Levels
eGFR < 15 Stage 5 CKD
Ensure has been referred to/is known to nephrology
cCA < 8.6
cCA=8.6-10.2
cCA > 10.0 (ensure thiazide diuretics stopped, calcium supplements stopped and recheck if appropriate
See Vitamin D protocol
Measure cCA every month
Measure 8 AM iPTH level
iPTH level low
iPTH level normal or high
Refer to endocrinologist
If iPTH < 22, consider and workup for hypercalcemia of malignancy
If patient taking calcium-based phosphate binders, the dose should be reduced or therapy switched to a non-calcium, non-albumin, non-magnesium containing phosphate binder. If patient taking vitamin D the dose should be reduced or discontinue
If patient taking supplemental Vitamin D, reduce dose or discontinue Vitamin D
Measure cCA in one month
cCA < 8.6
cCA=8.6-10.0
cCA > 10.0
Resume or increase calcium-based phosphate binders resume or increase Vitamin D
Measure cCA every month
Consider dialysis Refer to nephrology
Measure cCA in one month

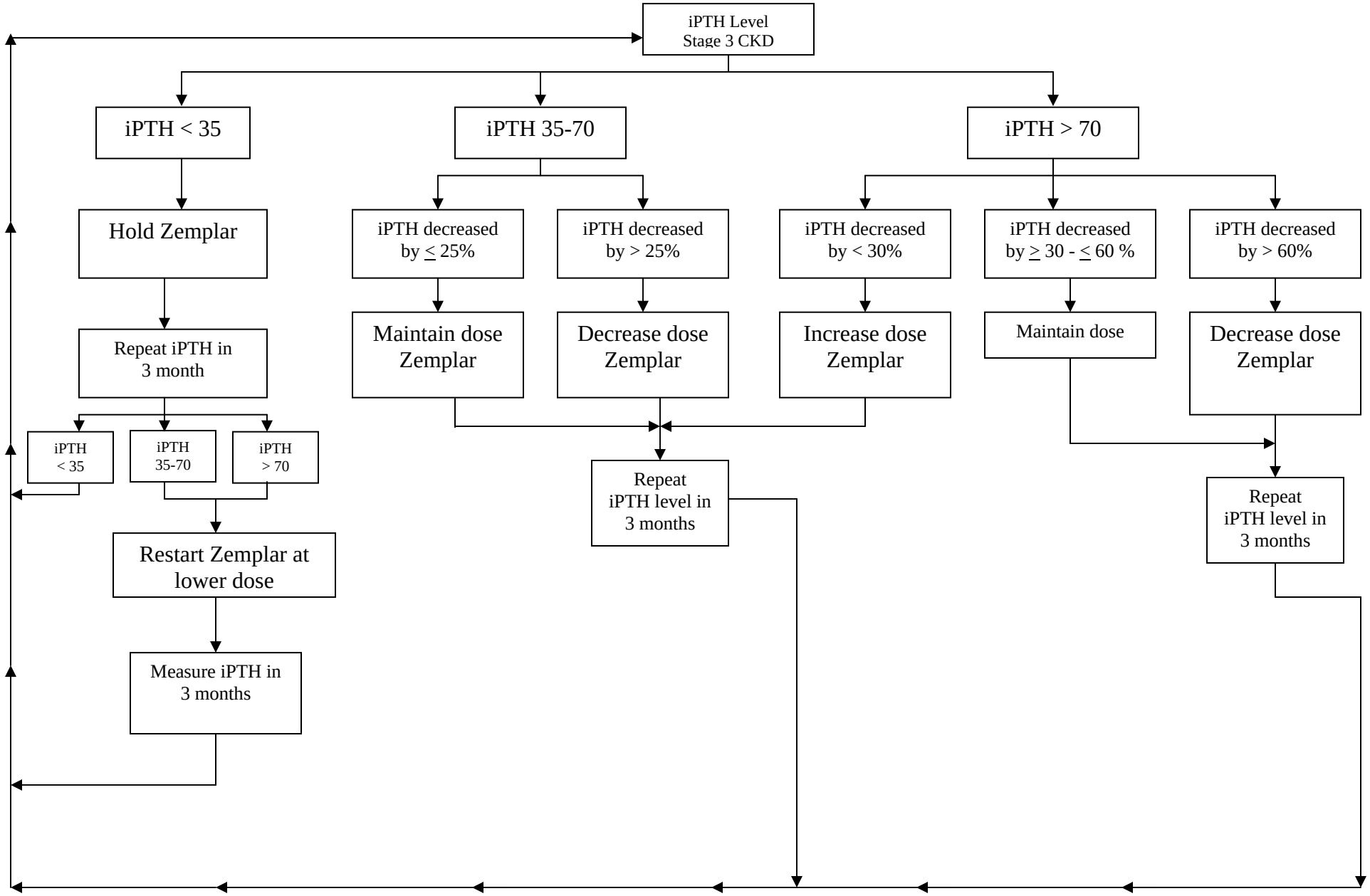

Intact PTH Levels
eGFR 30-59
Stage 3 CKD
iPTH level < 35
iPTH level 35-70
iPTH level > 70
Measure cCA
Measure iPTH level yearly
Measure 25 hydroxyvitamin D level
Refer to Page 18
25 hydroxyvitamin D level < 30
25 hydroxyvitamin D level ≥ 30
Refer to Vitamin D replacement protocol
Refer to Page 24


Intact PTH Levels
eGFR 15-29
Stage 4 CKD
iPTH level < 70
iPTH level 70-110
iPTH level > 110
Measure cCA
Measure iPTH level every 3 months
Measure 25 hydroxy Vitamin D level
Refer to Page 18
25 hydroxyvitamin D level < 30
25 hydroxyvitamin D level ≥ 30
Refer to Vitamin D replacement protocol
Refer to Page 24

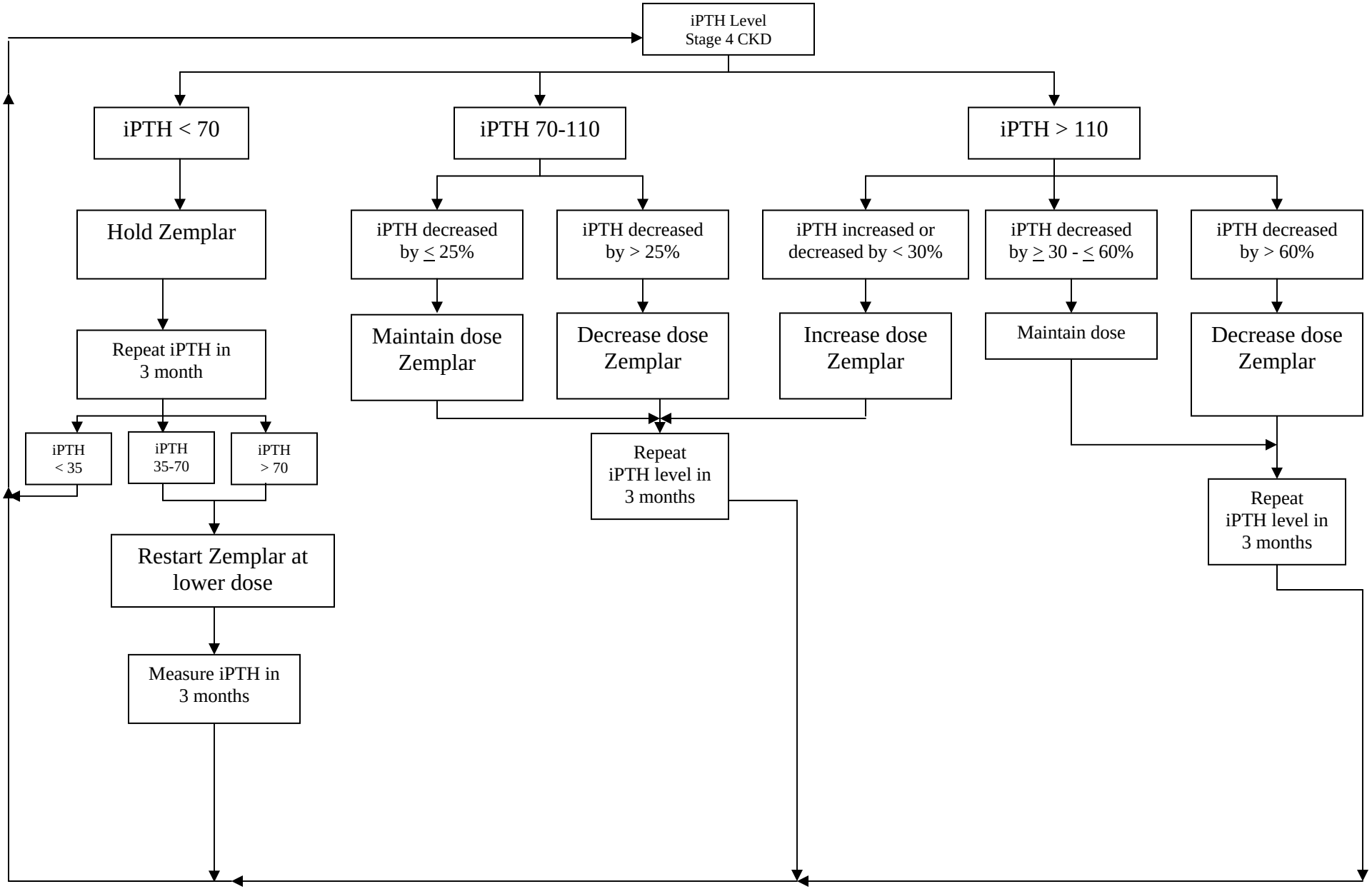

Intact PTH Levels
eGFR < 15
Stage 5 CKD
iPTH level < 150
iPTH level
150-300
iPTH level > 300
Measure cCA
Measure iPTH
level every
3 months
Measure 25
hydroxyvitamin D level
Refer to Page 19
25 hydroxyvitamin D
level < 30
25 hydroxyvitamin D
level ≥ 30
Refer to Vitamin D
replacement protocol
Refer to
nephrologist


eGFR = 30-59
Stage 3 CKD
Intact PTH (iPTH) Level > 70 pg/ml
and
25 hydroxyvitamin D level ≥ 30
and
Serum corrected calcium (cCA) < 9.5 mg/dl
and
Serum phosphorus < 4.6 mg/dl
and
Calculated cCA x P product < 55
Yes
No
Begin Zemplar (paricalcitol) 1 mcg daily
Physician to reevaluate patient
Measure iPTH in 12 weeks
Measure serum phosphorus (P) in 12 weeks
Measure corrected serum calcium (cCA) in 12 weeks
Calculate cCA x P product in 12 weeks
Refer to Page 25
Refer to Page 27
Refer to Page 28
Refer to Page 29

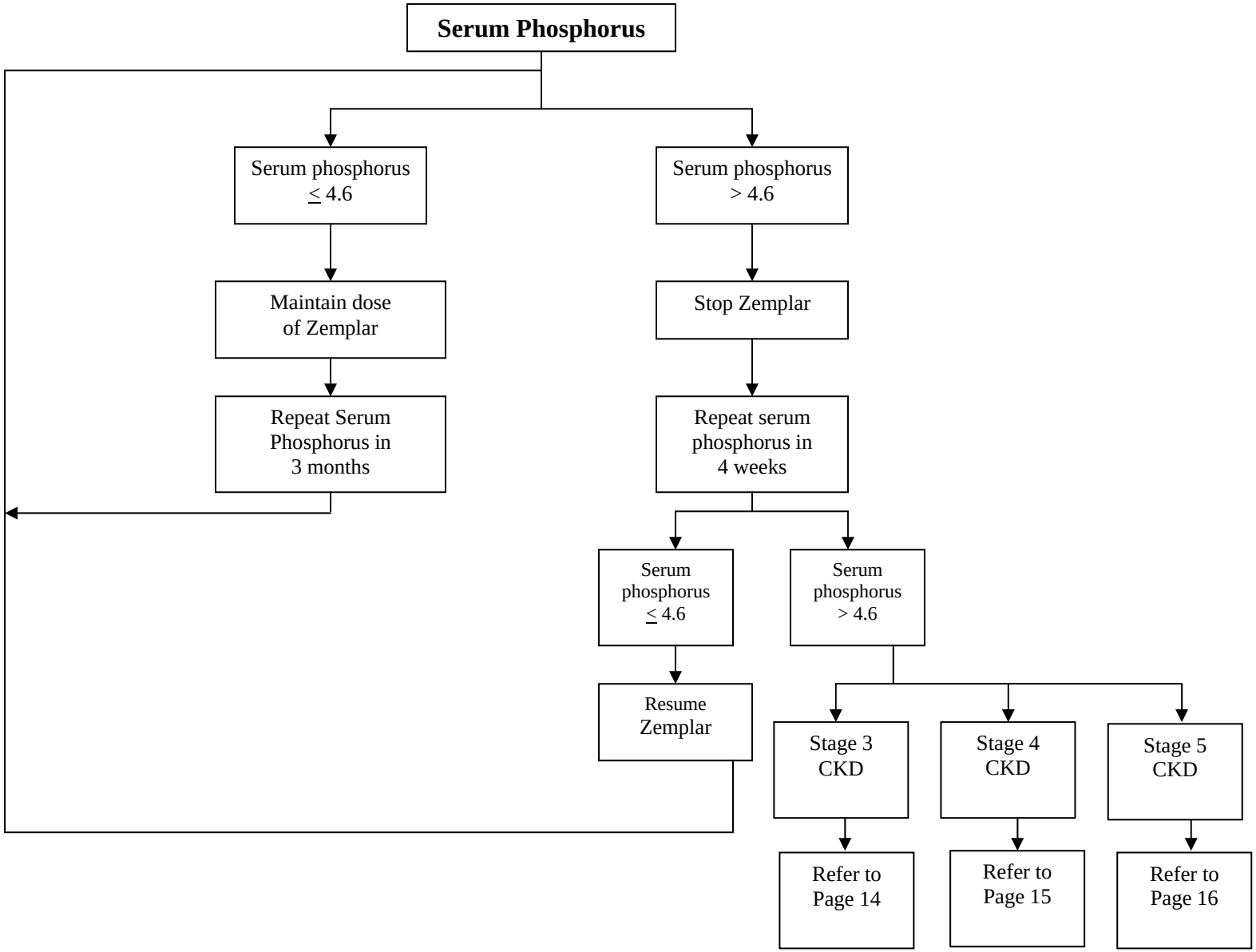

eGFR = 15-29
Stage 4 CKD
Intact PTH (iPTH) Level > 110 pg/ml
and
25 Hydroxyvitamin D level ≥ 30
and
Serum corrected calcium (cCA) < 9.5 mg/dl
and
Serum phosphorus < 4.6 mg/dl
and
Calculated cCA x P product < 55
Yes
No
Begin Zemplar (paricalcitol) 1 mcg (2 gel caps) daily
Physician to reevaluate patient
Measure BiPTH in 12 weeks
Measure serum phosphorus (P) in 12 weeks
Measure calculated serum calcium (cCA) in 12 weeks
Calculate cCA x P product in 12 weeks
Refer to Page 26
Refer to Page 27
Refer to Page 28
Refer to Page 29

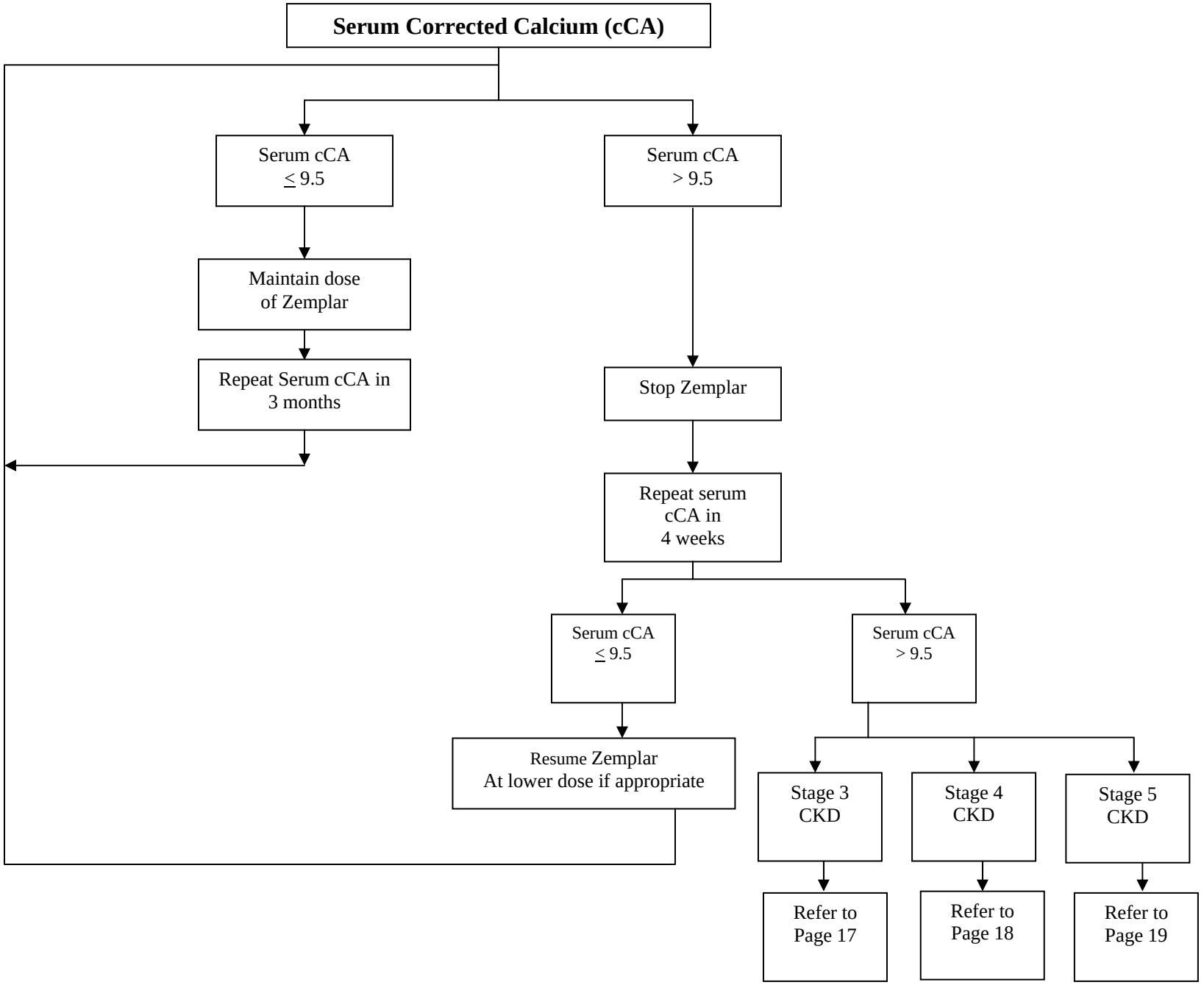


Low dose Zemplar – 1 mg three times a week, not more than every other day.
Routine dose Zemplar – 1 mg daily.
High dose Zemplar – 2 mg three times a week, not more than every other day.



Low dose Zemplar – 1 mg three times a week, not more than every other day
Routine dose Zemplar – 1 mg daily
High dose Zemplar – 2 mg three times a week, not more than every other day


Serum Phosphorus
Serum phosphorus ≤ 4.6
Serum phosphorus > 4.6
Maintain dose of Zemplar
Stop Zemplar
Repeat Serum Phosphorus in 3 months
Repeat serum phosphorus in 4 weeks
Serum phosphorus ≤ 4.6
Serum phosphorus > 4.6
Resume Zemplar
Stage 3 CKD
Stage 4 CKD
Stage 5 CKD
Refer to Page 14
Refer to Page 15
Refer to Page 16


Serum Corrected Calcium (cCA)
Serum cCA ≤ 9.5
Serum cCA > 9.5
Maintain dose of Zemplar
Repeat Serum cCA in 3 months
Stop Zemplar
Repeat serum cCA in 4 weeks
Serum cCA ≤ 9.5
Serum cCA > 9.5
Resume Zemplar At lower dose if appropriate
Stage 3 CKD
Stage 4 CKD
Stage 5 CKD
Refer to Page 17
Refer to Page 18
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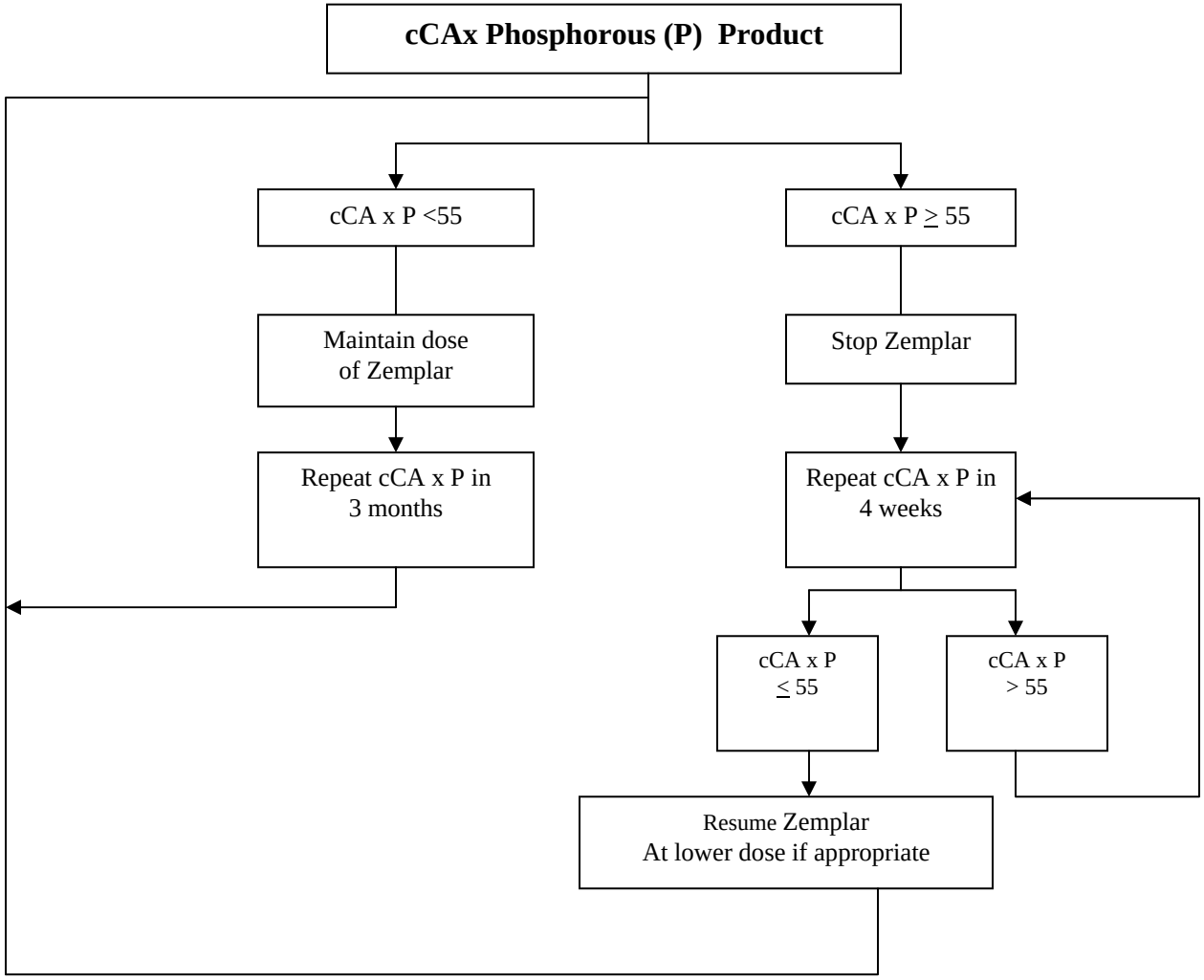
cCAx Phosphorous (P) Product
cCA x P <55
cCA x P ≥ 55
Maintain dose of Zemplar
Stop Zemplar
Repeat cCA x P in 3 months
Repeat cCA x P in 4 weeks
cCA x P ≤ 55
cCA x P > 55
Resume Zemplar At lower dose if appropriate