

Chronic Kidney Disease (CKD) Guideline

These clinical guidelines are designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients. They are not intended to replace a clinician's judgment or to establish a protocol for all patients with a particular condition. A guideline will rarely establish the only approach to a problem.

GUIDELINE HISTORY and APPROVAL

ACTION	SEED GUIDELINE and/or MAIN INFORMATION & GROUP SOURCE(S)	DATE	ORGANIZATION
Guideline Reviewed and Approved	2000 National Kidney Foundation (NKF) Kidney Disease Outcome Quality Initiative (K/DOQI) Website located at: http://www.kidney.org/professionals/kdoqi/guidelines.cfm	June & July 2004	Geisinger Health Plan/Chronic Kidney Disease Clinical Guideline Team
Guideline Reviewed and Approved	Same as above	August 02, 2004	Geisinger Health Plan/Medical Management Administrative Committee
Guideline Reviewed and Approved	Same as above	September 30, 2004	Geisinger Health Plan Medical Directors
Guideline Reviewed and Revised	Same as above	October 07, 2004	Geisinger Health Plan/Clinical Guideline Committee
Guideline Reviewed and Approved	Same as above	October 08, 2004	Geisinger Health Plan Pharmacy
Guideline Reviewed and Approved	Same as above	January 03, 2005	Geisinger Health Plan/Medical Management Committee
Guideline Reviewed and Approved	Same as above	January 2005	Geisinger Health Plan/Quality Improvement Committee
Guideline Reviewed and Approved	Same as above	July 5 - 24, 2006	Geisinger Health Plan Pharmacy
Guideline Reviewed, revised and Approved	Same as above	Aug 25, 2006	Specialty Physician Input
Guideline Reviewed, Approved	Same as above	Sept. 26 – Oct 6, 2006	Geisinger Health Plan Medical Directors

Chronic Kidney Disease (CKD) Clinical Guideline

Guideline Reviewed, Approved	Same as above	Nov. 6, 2006	Geisinger Health Plan Medical Management Committee
Guideline Reviewed, revised and Approved	Same as above	Jan.24, 2007	Geisinger Health Plan Quality improvement Committee
Guideline Reviewed, revised	1. Same as above 2. 2007 KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for Diabetes and Chronic Kidney Disease http://www.kidney.org/professionals/KDOQI/guideline_diabetes/pdf/Diabetes_AJKD_linked.pdf	June 2008	Geisinger Health Plan/Clinical Guideline Committee
Guideline Reviewed, Approved	Same as above	July 2008	Geisinger Health Plan Pharmacy
Guideline Reviewed, Approved	Same as above	Nov. 25- Dec.1, 2008	Geisinger Health Plan Medical Directors
Guideline Reviewed, Approved	Same as above	Dec. 1,2008	Geisinger Health Plan Medical Management Committee
Guideline Reviewed, Approved	Same as above	Jan. 28, 2009	Geisinger Health Plan Quality improvement Committee
Guideline Reviewed,	Same as above	Oct 1,2010 – Jan 26, 2011	Geisinger Health Plan/Clinical Guideline Committee
Guideline Reviewed,	Same as above	Dec. 20, 2010	Geisinger Health Plan Medical Management Committee
Guideline Reviewed,	Same as above	Jan. 26, 2011	Geisinger Health Plan Quality improvement Committee



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SEED GUIDELINES

2000 National Kidney Foundation (NKF) Kidney Disease Outcome Quality Initiative (K/DOQI)

Located at: <http://www.kidney.org/professionals/kdoqi/guidelines>

2007 KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for Diabetes and Chronic Kidney Disease

http://www.kidney.org/professionals/KDOQI/guideline_diabetes/pdf/Diabetes_AJKD_linked.pdf

OVERVIEW

Definition of CKD

1. Kidney damage for ≥ 3 months, as defined by structural or functional abnormalities of the kidney, with or without decreased GFR, manifested by either:
 - Pathological abnormalities; or
 - Markers of kidney damage, including abnormalities in the composition of the blood or urine, or abnormalities in imaging tests.
2. GFR < 60 mL/min/1.73m² for ≥ 3 months, with or w/out kidney damage.

Stages of CKD

Stage	Description	GFR	Action
1	Kidney damage w/ normal or elevated GFR	≥ 90	Dx and treatment of co-morbid conditions, slow progression, CVD risk reduction
2	Kidney damage with mildly decreased GFR	60 – 89	Estimating progression and as above
3	Moderately reduced GFR	30 – 59	Evaluating/treating complications of decreased kidney function
4	Severely reduced GFR	15 – 29	Preparation for replacement therapy
5	Kidney failure	< 15 (or dialysis)	Replacement therapy if uremic

Assessing Kidney Function

- Level of GFR is accepted as best measure of overall kidney function. Serum creatinine alone should not be used. GFR measures the filtering capacity of the kidneys. Some

individuals will have normal GFR but have signs of kidney damage – i.e. diabetic with proteinuria. Some individuals will have mildly decreased GFR but have no kidney damage – infants and older adults. These persons are described as having “decreased GFR” not CKD.

- In adults, the Modification of Diet in Renal Disease (MDRD) Study equation is generally preferred and is based on creatinine, age, sex and race. 24-hour urine collections for creatinine clearance and protein are generally not utilized anymore as they tend to overestimate GFR by as much as 23%.
- Normal mean GFR in young adults is 120 – 130 mL/min. Normal values for women are about 8% lower at all ages. GFR normally declines in adults after about age 30 – 40 years at about 1.0 mL per year. In addition to age, other causes of decreased GFR w/out kidney damage can be vegetarian diets, fluid depletion, heart failure, and cirrhosis.

Normal GFR In Adults (Mean Values)

Age	Mean for Men	Mean for Women
20 – 29	128	118
30 – 39	116	107
40 – 49	105	97
50 – 59	93	86
60 – 69	81	75
70 – 79	70	64
80 – 89	58	53

- It is possible that GFR of 30 – 59 mL/min could be normal for individuals at the extremes of age, in vegetarians, or after nephrectomy. A GFR < 30 mL/min is abnormal at any age other than in a neonate.
- GFR should be estimated annually for all pts with CKD and more often in pts with GFR < 60, GFR decline of ≥ 4 mL/min/year, risk factors for faster decline, and exposure to risk factors for acute GFR decline.
- All patients with GFR < 30 mL/min should be referred to a nephrologist.
- The natural history of most chronic kidney diseases is the GFR declines progressively over time. Average rate of decline in CKD is about 4 mL/min/year. So for someone with a GFR just under 60 who is declining about 4 mL/min/year, kidney failure can be expected in about 10 years. Predicting kidney decline should be based on minimum of 3-4 previous measurements.
- The rate of GFR decline is faster for diabetic kidney disease, glomerular diseases, and kidney disease in transplant recipients than in hypertensive kidney disease and

tubulointerstitial kidney diseases. Rate of decline is also faster in African-American race, male gender, older age and persons with lower baseline GFR.

Proposed Years Until Kidney Failure

Level of GFR	Decline of 10 mL/yr	Decline of 8 mL/yr	Decline of 6 mL/yr	Decline of 4 mL/yr	Decline of 2 mL/yr	Normal decline of 1 mL/yr
90	7.5 yrs	9.4 yrs	13 yrs	19 yrs	38 yrs	75 yrs
80	6.5 yrs	8.1 yrs	11 yrs	16 yrs	33 yrs	65 yrs
70	5.5 yrs	6.8 yrs	9.2 yrs	14 yrs	28 yrs	55 yrs
60	4.5 yrs	5.6 yrs	7.5 yrs	11 yrs	23 yrs	45 yrs
50	3.5 yrs	4.4 yrs	5.8 yrs	8.8 yrs	18 yrs	35 yrs
40	2.5 yrs	3.1 yrs	4.2 yrs	6.3 yrs	13 yrs	25 yrs
30	1.5 yrs	1.9 yrs	2.5 yrs	3.8 yrs	7.5 yrs	15 yrs
20	0.5 yrs	0.6 yrs	0.8 yrs	1.3 yrs	2.5 yrs	5.0 yrs

- Kidney failure is defined as either a GFR < 15 mL/min usually with symptoms of uremia, or need for dialysis. Kidney transplant patients are not included in definition of kidney failure unless GFR < 15 or they have resumed dialysis. Transplant patients are considered to have CKD and are generally staged by their GFR.
- Replacement therapy is initiated based on level of kidney function, signs or symptoms of uremia, availability of therapy, and pt preferences. Mean level of serum creatinine at start of dialysis is about 8.5 and GFR is 7 mL/min. Dialysis is often started at higher level of GFR for older pts and pts with DM or CVD.

Classification of CKD by Pathology

Pathology	Etiology	Prevalence
Diabetic glomerulosclerosis	Types 1 & 2 Diabetes	33% - largest single cause of kidney failure
Other Glomerular Diseases	Lupus, vasculitis, endocarditis, Hepatitis B or C, HIV, Hodgkin's, heroin toxicity	19%
Vascular Diseases	Renal artery stenosis, HTN, Sickle cell disease	21%
Tubulointerstitial Diseases	Stones, infections, NSAID, Antibiotics, Sarcoidosis, Ureteral reflux, Multiple myeloma	4%
Cystic Diseases	Polycystic kidneys	6%
Diseases in Transplant	Drug toxicity – cyclosporine or tacrolimus Glomerular diseases (recurrent disease)	? – not reported in data base

Risk Factors for CKD

- Diabetes and HTN
- Autoimmune diseases
- Systemic infections
- UTIs and urinary stones
- Lower urinary tract obstruction
- Neoplasms
- Family history of CKD
- Recovery from acute renal failure
- Reduction in kidney mass
- Drug exposure
- Low birth weight
- Older age
- Ethnic minorities – African-American, American Indian, Hispanic and Asian
- Chemical or environmental exposures
- Low income/education

Markers of Kidney Disease

Markers of kidney damage include abnormalities in the composition of the blood or urine or abnormalities in imaging tests:

- Proteinuria – this includes microalbuminuria or albuminuria. Albumin is the most abundant urine protein and in most cases proteinuria and albuminuria are interchanged. Microalbuminuria is excretion of small but abnormal amounts of albumin now detectable with more sensitive lab methods.
- Albumin – *Normal* < 30 mg/day for 24 hr or < 3 mg/dl in albumin-specific spot dipstick or < 25 mg/g in spot albumin/creat ratio; *Microalbumin* 30 – 300 mg/day for 24 hr or > 3 mg/dl on spot albumin-specific dipstick or 25 – 300 mg/g on ratio; & *Proteinuria* > 150 mg/day for 24 hr or > = 150 mg/g on ratio.
- Most individuals excrete small amounts of protein in urine. Persistent protein excretion is usually a marker of kidney disease. Common causes of false positives include fluid imbalance, hematuria, exercise, and infection.
- Screening for non-risk individuals – standard urine dipsticks for protein are acceptable. For screening at-risk individuals – albumin to creatinine ratios are preferred as well as serum creatinine to ascertain estimated GFR.
- Urine for RBCs, leukocytes or cellular casts indicate potential problems but are also associated with other conditions, so need to be evaluated along with other findings.
- Imaging studies – look for stones, cysts, masses, size, obstruction, reflux, scarring, etc

Treatment of Chronic Kidney Disease

- Evaluation and treatment of co-morbid conditions – diabetes, HTN, tobacco cessation, heart failure, etc.
- Slowing loss of kidney function – HTN control, glycemic control, ACE or ARBs. Correction of anemia may help. Avoid NSAIDs, volume depletion, IV contrast, and certain antimicrobial agents. Prompt treatment of UTIs.
- Prevention and treatment of CVD – CKD is a high risk for CVD and all pts with CKD should be regularly screened for CVD and appropriate therapies instituted.
- Prevention and treatment of complications associated with decreased kidney function – HTN, anemia, malnutrition, bone disease, neuropathy, and impairment of functioning and well-being.
- Preparation for kidney failure and replacement therapy – access preparation, transplant lists, etc.
- Renal replacement therapy (RRT) when signs and symptoms of uremia present – dialysis or transplantation.

Hypertension Management in CKD

HTN is both a cause and complication of CKD. HTN is usually found early in CKD and is associated with adverse outcomes, particularly faster loss of renal function and development of CVD.

- Pathology of HTN in CKD – extracellular fluid volume expansion, renin-angiotensin aldosterone system stimulation, increased body weight, erythropoietin administration, calcified arterial tree, and renal vascular disease/stenosis.
- Needs to be closely monitored – home monitoring recommended.
- Target of < 130/80
- ACE Inhibitors or ARBs preferred if proteinuria is present. ACEs or ARB's may increase hyperkalemia. ACEs probably also have a cardiac advantage as well as renal protection.
- Reduction in sodium for all stages and reduction in fluid intake for Stage 5.

Note: Pharmaceutical coverage is dependent upon individual pharmacy benefit design and certain drugs may require prior authorization. Providers are encouraged to review the GHP formulary at <http://www.thehealthplan.com>, or contact the GHP Pharmacy Department at 1-800-988-4861.

Anemia Management in CKD

Anemia develops in the course of CKD and is seen in almost all pts with kidney failure. Pts with GFR < 60 should be evaluated for anemia.

- Measures to evaluate anemia include hemoglobin (Hgb), hematocrit (Hct), and iron stores (ferritin, transferrin saturation). Hgb is preferred over Hct as Hct is a derived value affected by plasma water and is affected by shifts in plasma volume with diuretics and dialysis.
- Anemia clinically is defined for males as Hgb < 13.0 g/dL and for women as Hgb < 12.0 g/dL.
- Anemia develops probably from loss of erythropoietin synthesis in kidneys and increased presence of inhibitors of erythropoiesis. Other factors contributing to anemia include iron deficiency, blood loss, reduced half-life of circulating RBCs, and deficiencies of folate or Vitamin B12. Severity of anemia is related to duration and extent of kidney failure.
- Lower Hgb levels are associated with higher rates of hospitalizations, CV disease, cognitive impairment, and mortality.
- Hemoglobin levels generally recommended every 3 – 6 months. Treatment is strongly recommended if Hgb < 10.0 . (May be started at higher hemoglobin levels depending on reimbursement regulations)
- Medication management – epoetin (Procrit or Epogen) or darpepoetin (Aranesp). Goal is Hgb 11 – 12.
- B/P monitoring is very critical in treatment with erythropoietin because of increases in B/P.
- Fe, ferritin and transferrin saturation will also be monitored to evaluate iron deficiency. IV iron may be used for iron deficiency.

Nutritional Status

Low protein and low calorie intake are important causes of malnutrition in CKD. Anorexia caused by declining GFR contributes significantly to decreased protein and calorie intake. Pts with GFR < 60 should have a nutritional assessment of dietary protein, caloric intake and nutritional status.

- Serum albumin is one of most important markers of protein-energy malnutrition (PEM) – value even slightly less than 4.0 g/dL is important. Low serum bicarbonate levels (which drop with renal insufficiency) have been shown to be associated with protein degradation.
- 50 – 70% of dialysis pts have PEM. PEM is one of most significant markers of adverse outcomes. Risk of hospitalizations and mortality are inversely correlated to nutritional markers. The nutritional status of a patient at start of dialysis is a clinically significant risk factor for subsequent clinical outcomes (morbidity and mortality).
- Uremia predisposes patients to decreased appetite and calorie intake.
- Referral to dietitian with renal background recommended for all patients with GFR < 30. Consider sooner referral for patients with decreased protein and caloric intake, low albumin, etc.

Bone Disease – Disorders of Calcium and Phosphorus

CKD is associated with a variety of bone disorders and disorders of calcium and phosphorus. Disorders of bone are classified into 2 types: 1) high parathyroid hormone (PTH) levels (osteitis) and 2) low or normal PTH levels (adynamic bone disease).

- Hyperparathyroidism – decreased kidney function leads to reduced phosphorus excretion and phosphorus retention; elevated serum phosphorus levels suppress calcitriol production; reduced kidney mass also contributes to decreased calcitriol production; decreased calcitriol production reduces calcium absorption from the gut thus leading to hypocalcemia. All these factors (hypocalcemia, reduced calcitriol synthesis, and elevated phosphorus levels) stimulate production of PTH. High PTH levels may result in high bone turnover. The typical lesion – osteitis fibrosa cystica is characterized by abnormally woven osteoid, fibrosis, and cyst formation which decreases cortical bone and bone strength and results in fracture.
- Classic abnormalities are low calcitriol and calcium levels, and high phosphorus and PTH levels.
- About 40% of pts with Stage 4 and 100% of pts with kidney failure have bone changes. Changes begin much sooner and if treatment is to be successful, screening and appropriate therapies need to be instituted earlier.
- Markers for bone disease to be monitored include PTH, calcium and phosphorus, & Vitamin D.

Neuropathy

Neuropathy is a common complication of CKD. May be manifested as encephalopathy, peripheral polyneuropathy, autonomic dysfunction, sleep disorders, and peripheral mononeuropathy. Neuropathy is related to the level of kidney function, not the type of kidney disease.

- Uremic neuropathy is not well understood. Levels of urea, creatinine, and PTH appear to be related to decreased nerve conduction velocity and demyelination of nerves.
- Usually characterized by symmetrical, mixed sensory and motor polyneuropathy. Pts complain of pruritus, burning, muscle irritability, cramps or weakness. Can also have impaired heart rate and blood pressure variability with autonomic neuropathy. Encephalopathy appears to be related more to acute decline in GFR.
- Signs on exam include muscle atrophy, loss of deep tendon reflexes, poor attention span, impaired abstract thinking, absent ankle jerks, and impaired sensation.
- No studies indicate that neuropathy contributes to morbidity and mortality associated with CKD – but it does significantly reduce quality of life and functionality.
- Good skin care is essential to prevent ulcers.

Functioning and Well-Being

Impairments in functioning and well-being that develop during CKD are associated with adverse outcomes.

- Baseline assessments should be conducted so changes over time can be monitored.
- Dialysis pts report significantly more body pain, lower vitality, poorer general health, greater physical, mental and social dysfunction, and greater limitations in their ability to work and participate in ADLs.
- At least 25% of dialysis pts are clinically depressed.
- Impairments in well-being and functioning are related to increased hospitalizations and death, while improvements in QOL scores are related to better outcomes.

Prevention and Treatment of Cardiovascular Disease

CVD accounts for 40 – 50% of deaths in pts with kidney failure. Patients with CKD, irrespective of diagnosis, are at increased risk for CVD, cerebrovascular disease, PVD, and HF. All pts with CKD need to have regular assessment of CVD risk factors.

- Traditional risk factors include diabetes, older age, HTN, elevated LDL, low HDL, tobacco abuse, menopause, family history of CVD.
- CKD-related risk factors include proteinuria, decreased GFR, extracellular fluid volume overload, abnormal calcium and phosphorus metabolism, anemia, malnutrition, inflammation, infection, and uremic toxins.
- Most pts with CKD do not progress to kidney failure but die instead from CVD
- Strategies must be aimed at lowering blood pressure, smoking cessation, management of glycemic control, and lipid management.

Self-Management Education

Over 20 million adults in US have CKD, and another 20 million at increased risk. Education about CKD needs to be part of the management of persons at risk for CKD.

- People at risk need to have regular measurement of creatinine, spot urine for albumin/creatinine ratio and blood pressure.
- Lifestyle changes – exercise, tobacco cessation, healthy eating.
- Medication adherence
- Strict blood pressure and glycemic control lowers risk for CKD.
- Early treatment of CKD with ACEs/ARBs reduces risk of renal failure and CVD.
- Treatment for anemia improves QOL and is associated with decreased CVD risk.
- Bone health – calcium and safety.
- Nutrition – proper protein and calorie intake, phosphorus and calcium management.
- Prompt recognition and treatment of UTIs and stones.
- Avoiding renal toxic therapies – NSAIDs, IV contrast, certain antibiotics, volume depletion, etc.
- Fluid management, access care and infection prevention for pts with renal failure.

Transplant Recipients

Kidney transplantation improves QOL and length of life in nearly all patients who undergo this therapy.

- Risk of rejection is highest during first 3 months after transplantation.
- Patients are generally staged according to GFR – are no longer considered to have kidney failure unless GFR < 15 or they have resumed dialysis.
- Action plan for fever, chills, decreased urination, rise in B/P, increased edema, anorexia, SOB, etc.
- Follow-up studies generally include CBC, Na, K+, bicarbonate, BUN, creatinine, calcium, phosphorus, and blood glucose.
- Pts are at increased risk for squamous cell skin cancer as a result of immunosuppressive therapy. Sun precautions and regular examination important long term.
- Women also at increased risk of breast or cervical cancer so annual PAP and annual mammograms recommended.
- Patients who receive cyclosporine – are at risk for gingival hyperplasia, therefore good oral hygiene and regular dental exams are recommended.
- HTN common issue and good control vital. Dyslipidemia needs to be managed as well as CVD is common.
- Osteoporosis may be a major issue with transplant patients – men and women. BMD recommended, calcium intake of at least 1500 mg/day. Bisphosphonates are therapy of choice.
- Counseling and medication adherence.

GOALS

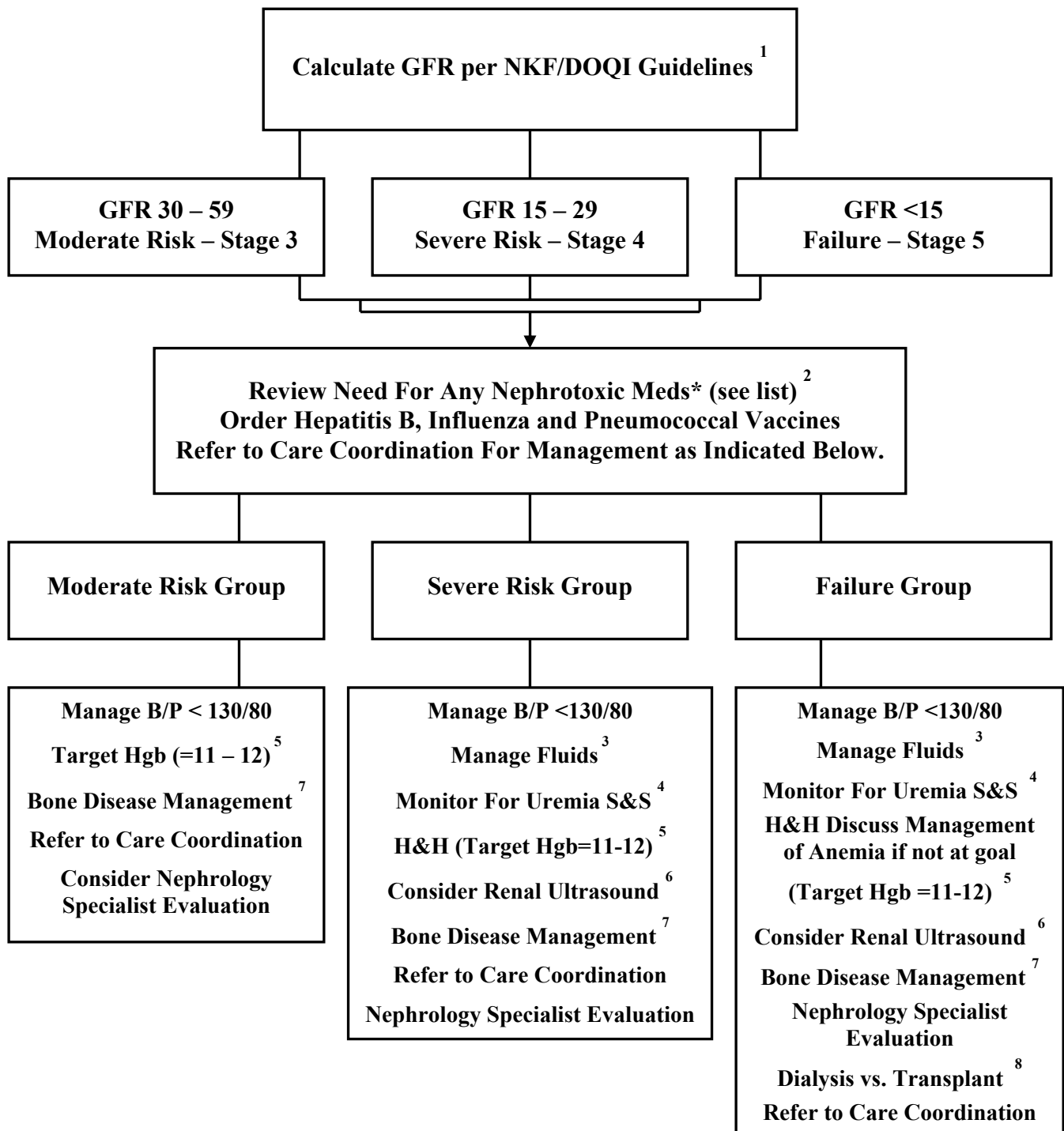
- Identify patients with CKD and coordinate appropriate services
- Evaluate and manage co-morbid conditions to slow the loss of kidney function
- Evaluate and manage risk factors to prevent or treat cardiovascular disease
- Evaluate and treat complications associated with decreased kidney function
- Prepare patients for kidney failure and replacement therapy
- Coordinate services for kidney function by dialysis or transplantation, when indicated

FAST FACTS

- CKD is defined as kidney damage, as confirmed by kidney biopsy or markers of damage, or glomerular filtration rate (GFR) $< 60 \text{ mL/min/1.73 m}^2$ for ≥ 3 months
- Among individuals with CKD, the stage of disease is based on the level of GFR
- CKD is a risk factor for cardiovascular disease (CVD)
- Strategies and Therapeutic targets for antihypertensive therapy in CKD follows the JNC 7 recommendations for the treatment of high blood pressure
- Reducing proteinuria is a goal for antihypertensive therapy in CKD

ALGORITHM

The Geisinger Health Plan Chronic Kidney Disease Guideline follows the recommendations of the 2000 National Kidney Foundation (NKF) Kidney Disease Outcome Quality Initiative (K/DOQI) as portrayed in a more simplified version that follows.



ANNOTATIONS

1. National Kidney Foundation Kidney Disease Outcomes Quality Initiative (K/DOQI) Classification

Risk Stratification	Stage Description	GFR	Goals
-----	----- At increased risk	≥ 90 (with chronic kidney disease risk factors)	Screening; chronic kidney disease risk condition
-----	1. Kidney damage with normal or increased GFR	≥ 90	Diagnosis and treatment; treatment of co-morbid conditions; slowing progression; CVD risk reduction
-----	2. Kidney damage with mild decreased GFR	60-89	Estimating and slowing progression; treatment of co-morbid conditions
Low	3. Moderately decreased GFR	30-59	Evaluating and treating complications; Estimating and slowing progression; treatment of co-morbid conditions
Moderate	4. Severely decreased	15-29	Preparation for kidney replacement therapy; treatment of complications and co-morbid conditions
High	5. Kidney Failure	< 15 (or dialysis)	Kidney replacement (if uremia present)

http://www.kidney.org/professionals/KDOQI/guidelines_ckd/p1_exec.htm

ANNOTATIONS

2. Commonly Used Medicines to Review with Patient
May need dosage adjusted* or avoid med per PCP/Nephrology

Note: Pharmaceutical coverage is dependent upon individual pharmacy benefit design and certain drugs may require prior authorization. Providers are encouraged to review the GHP formulary at <http://www.thehealthplan.com>, or contact the GHP Pharmacy Department at 1-800-988-4861.

Allopurinol*
Aminoglycosides*
Amphotericin B*
NSAIDS
Colchicine*
Cyclosporine
Fluoroquinolones*

- Levofloxacin
Furosemide
- High Doses Only

Triamterene*
- Kidney Stones

Mannitol
Anti-virals*
- Always Check, Common In Many
Cisplatin
Lithium
Methotrexate
Penicillins*

Cephalosporins*

Sulfonamides (Antibacterial)*
Tetracyclines*
Vancomycin*
Hydrochlorothiazide

3. Fluid Management

Refer to Care Coordination for:

1. Monitoring and recording of daily weight
2. No added sodium diet
3. Recording of fluid intake – dietitian may recommend restriction.

If on dialysis, patient will get weight gain parameters given by Nephrology

4. Uremia signs and Symptoms

- Dyspnea, pruritis, nausea, decreased appetite, oligouria, pale and sallow complexion, edema of hands, face and legs, metallic taste in mouth
- Facilitate immediate follow up with Nephrology Specialist if present.

ANNOTATIONS

5. Anemia Management

- Hemoglobin and Hematocrit Measures:
 - H & H at least every 6 months if GFR is 60.
 - H & H at least every 6 months if GFR is 30-59.
 - H & H monitored at least every 6 months or more frequently per Nephrologist for GFR <30. If hemoglobin is ≤ 10 , treatment with Epogen, Procrit, or Darbepoetin is recommended. May be started at higher hemoglobin levels depending on regulations
- Medication management for treatment of Hgb = 10 - 12 when other reversible causes of anemia have been corrected.
 1. Epogen (epoetin alpha): Starting dose 50-150u/kg SC 1-3x weekly; maintenance dose individually titrated but average dose 75 – 150 u/kg.
 2. Procrit (epoetin alpha): Starting dose 50 – 150 u/kg SC 1 – 3x weekly; maintenance dose individually titrated but average dose 75 – 150 u/kg.
 3. Aranesp (darbepoetin alpha): Starting dose 0.45 mcg/kg SC 1x weekly; maintenance dose individually titrated but may be less than starting dose.
 4. Target goals for Hbg 11- 12 & Hct 30 – 36%
 5. Medications adjusted every 4 – 8 weeks based on H & H
 6. Reductions in dose recommended for Hct > 36% or Hgb > 12
- Advise patient of need for daily BP monitoring and need to call if associated rise in BP with therapy.
- FE supplementation often recommended if iron deficiency (Venofer – may be used) when other reversible causes of anemia have been corrected such as iron deficiency B₁₂ deficiency, Folic acid deficiency, etc.
- Maintain transferrin saturation between 20% to 50%. Check monthly on treatment.
- Maintain ferritin between 100 ng/mL to 800 ng/mL. Check every 3 months on treatment.

http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p6_comp_g8.htm

6. Renal Ultrasound

Renal ultrasound recommended for CKD.

Identifies polycystic disease, urinary track stones, infections, obstruction, reflux and size of kidney. These include patients with recurrent history of urinary tract obstruction, infections, or stones; those with a family history of polycystic kidney disease; and those with known kidney damage.

http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p5_lab_g6.htm

ANNOTATIONS

7. Bone Disease Management

- Patients with GFR < 60 should be evaluated for bone disease.
 - Serum PTH, calcium, phosphorus levels should be monitored
- DXA Scan, Vitamin D levels, bone x-rays should be considered
- If serum phosphorus > 5, may consider phosphate binders Recommend patient take phosphate binders with food.
- RD referral recommended
- Refer to Care Coordination for follow up.

http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p6_comp_g10.htm

8. Dialysis vs. Transplant Considerations

GFR < 20

Have patient evaluated by Care Coordination nurse and Nephrology team

9. Refer to Care Coordination for Telephone Monitoring

Follow Up phone call intervention will be done by CC to assess the following:

1. Weight gain.
2. Patients knowledge of significance of weight gain and acceptable/unacceptable weight gain.
3. Changes in appetite.
4. Review access site education - infection? chill? fever?
5. Any increases in SOB since they last saw their physician?
6. Patients transportation concerns for appointments.
7. Medication compliance and understanding.

MEASURES

- Percent of members with GFR < 30% who have Hemoglobin (Hb) testing
- Percent of members with GFR < 30% that are managed by nephrology
- Percent total enrolled population with BP <130/80
- Percent low risk with BP <130/80
- Percent moderate risk with BP <130/80
- Percent high risk with BP < 130/80
- Admits/1000
- Inpatient days/1000
- ER days/1000

REFERENCES

National Kidney Foundation (NKF) Kidney Disease Outcome Quality Initiative (K/DOQI), 2000.

Main Seed Guidelines website is located at:

<http://www.kidney.org/professionals/kdoqi/guidelines.cfm>

Stratification of CKD patients

http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p4_class_g1.htm

Anemia Management

http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p6_comp_g8.htm

Renal Ultrasound

http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p5_lab_g6.htm

Bone Disease Management

www.kidney.org/professionals/kdoqi/guidelines_ckd/p6_comp_g10.htm

http://www.kidney.org/professionals/kdoqi/guidelines_bone/