

Dental issues in Chronic Kidney Disease Patients

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The Goals of Recognizing CKD

- | Physician | Dentist |
|---|---|
| • Avoid morbidity | • Avoid Morbidity |
| • Delay progression of kidney disease | • Delay progression of kidney disease |
| • Avoid mortality | • Avoid mortality |
| • Educate the patient and their family/loved ones | • Educate the patient and their family/loved ones |

Stages of Chronic Kidney Disease & Recommended Clinical Action

Stage	Description	GFR ml/min/1.73m ²	Action
0	At Increased risk	>90 with CKD risk factors	Screening CKD risk reduction
1	Kidney damage with normal or ↓ GFR	≥ 90	Dx & Rx of common conditions Slow progression, CVD risk ↓
2	Kidney damage with Mild ↓ GFR	60 - 89	Estimating progression
3	Moderate ↓ GFR	30 - 59	Evaluating and treating complications
4	Severe ↓ GFR	15 - 29	Preparation for renal replacement therapy
5	Kidney failure	<15 or dialysis	Replacement if uremia present

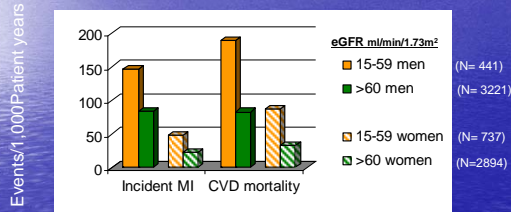
NKF. Am J Kidney Dis. 2002;39(suppl 1):S 1-S266

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CVD outcomes by level of Kidney Function



Meisinger, C. et al. European Heart Journal 2006

Stages of Chronic Kidney Disease & Recommended Clinical Action

Stage	Definition	Key Findings	Action
0	At Risk	Increased Risk for Surgical complications •Cardiac •Early mortality	Screening & risk reduction
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Stages of Chronic Kidney Disease & Recommended Clinical Action

Stage	Definition	Key Findings	Action
0	At Risk	Increased prevalence of Oral malodor/bad taste Xerostomia Periodontal disease Mucosal lesions Bone abnormalities	Screening & risk reduction
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Why is it important to recognize CKD ?

- > 20 million people in the US have CKD
- 11% of the adult American population – 19 Million adults
- 11 million have stage 3 CKD (GFR<60ml/min/1.73m²)
 - 6.6 million age > 60 years have stage 3 CKD

Why is it important to recognize CKD?

Independent risk factor for

- Death
- CV disease
- Hospitalizations

Complications of CKD Stage 3

GFR 30 -59 ml/min/1.73m²

- Hypertension
- Impaired Cardiac Function (CHF, LVH, CAD)
- Hyperlipidemia
- Anemia
- Calcium, Phosphorus, Vit D abnormalities
- Electrolyte Disturbances

Complications Of CKD Stages 4-5 Uremia

- Metabolic Acidosis
- Peripheral Neuropathy
- Restless Legs Syndrome
- Sleep Disorders
- Impotency
- Amenorrhea
- Bleeding Tendency
- PVD
- CAD
- CVD
- CHF
- CNS Toxicity
- Gastritis/Colitis
- Constipation
- Pseudogout / Periarteritis
- Hyperpigmentation
- Pruritis
- Pericarditis
- Bone disease
- Arrhythmias
- Malnutrition
- Muscle wasting

Oral & Dental complications of CKD/ESRD

- Oral malodor/bad taste
- Gingival bleeding
- Pale gingiva
- Gingival enlargement
- Delayed eruption
- Enamel hypoplasia
- Loss of lamina dura
- Widening of periodontal ligament
- Severe periodontal destruction
- Tooth mobility
- Drifting
- Pulp calcification
- Pulp narrowing
- Demineralization
- Decreased
 - trabeculation
 - cortical bone thickness
- Ground-glass appearance
- Metastatic soft-tissue calcification
- Radiolucent Fibrocystic and giant cell lesions
- Lytic areas
- Jaw fractures
- Abnormal bone healing after extraction

Increased surgical/procedural risk CKD & ESRD

multi-system involvement

- Malnutrition
- Multiple medications
- Altered volume status
- Electrolyte /acid-base imbalances
- Abnormal coagulation
- Co-morbid illnesses
 - Diabetes Mellitus
 - HTN
 - CAD/heart disease
 - PVD
 - Autonomic dysfunction
 - Cerebral VD
 - Pulmonary disease
 - Immune mediated diseases

Goals for patients at the time of a procedure/exam

- Euvolemic
- Normotensive
- Normonatremic
- Normokalemic
- Normal platelet function/coagulation
- Not anemic
- No bone disease
- Not uremic
 - Inflammation
 - Immunocompromise

What is the renal function ?

- What is the best way to determine it ?

Options to estimate clearance

1. 24 hr creatinine clearance
2. Serum creatinine
3. Cockcroft – Gault formula
4. Cystatin C
5. MDRD (4-v) formula

Patient information YOU want to know

- Medical conditions
- Medications
- Measure of renal function
- Blood pressure
- Proteinuria
- Hyperlipidemia
- Hemoglobin – level of anemia
- Evidence of bleeding disorder

- Kidney disease
- Diabetes Mellitus
- Heart Disease
- Hypertension
- PVD
- Stroke
- Chronic disease

Hypertension – treatment goals

	BP Target mmHg
General population	<130/80
CKD with proteinuria (>1g/d)	<120/75
CKD No proteinuria (<1g/d)	<130/80
ESRD (Hemodialysis)	<130/80
ESRD (Peritoneal dialysis)	<130/80
Renal Transplant with proteinuria (>1g/d)	<125/75
Renal Transplant No proteinuria (<1g/d)	<130/80

Hypertension

- Volume related
- loop diuretics
 - Excess renin
 - ACE/ARB
 - B blocker
 - Calcium channel blockers
- Caution:**
Hyperkalemia
- Decrease GFR
- Heart block
- Gingival enlargement
-

Proteinuria

Proteinuria is evidence of endothelial dysfunction

Proteinuria ⇒

- mesangial toxicity
- tubular overload
- hyperplasia
- induction of proinflammatory molecules
- Increased endothelial permeability

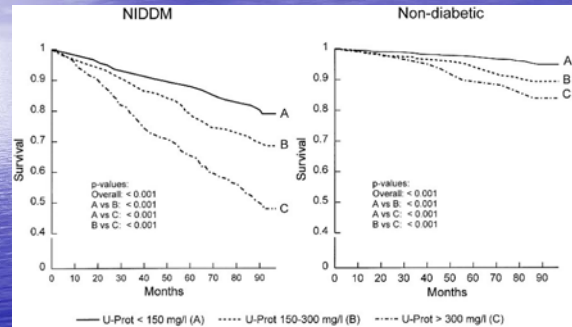
Proteinuria

Proteinuria is evidence of endothelial dysfunction and is proinflammatory

Increased risk of

- Stroke
- Cardiovascular disease
- Progression of kidney disease
- Death

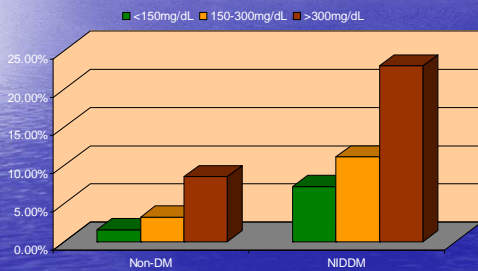
Proteinuria: effects on CVD risk factors



Miettinen H, et al. Stroke, 1996

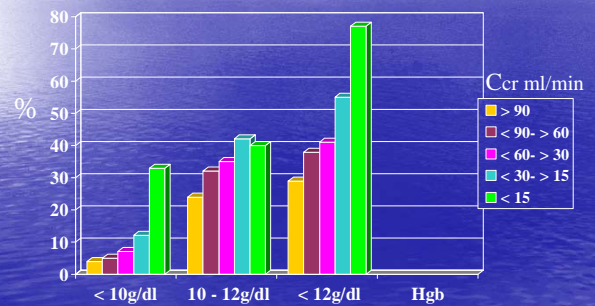
Proteinuria: effects on CVD risk factors

Incidence of stroke



Miettinen H, et al. Stroke, 1996

Prevalence of Anemia by Creatinine Clearance



K-DOQI Guidelines for treating Anemia in ESRD

KDOQI Guidelines	1997	2001	2003	2007	FDA 2006
Hgb g/dl target	11-12	11-12	11-13 *	≤13	≤12 **

* 2.12 %: there is significant evidence to recommend routinely maintaining hemoglobin at 13.0 g/dl or greater in ESA-treated patients*

** 2007 Black box warning: avoid the need for blood transfusions

Hgb <9 g/dl associated with

- Fatigue
- Depression
- Reduced exercise tolerance
- Dyspnea
- Bleeding disorder
- LVH
- LV dysfunction
- Mortality
- Morbidity
- Hospitalizations
- LOS

Hgb ≥ 11
improved quality of life

HD, PD, Pre-dialysis

Outcomes with Target Hemoglobin >12 g/dl on HD

- No improvement in LVH (Besarab, A. et al, J Am Soc Nephrol, 2008)
- Trend toward higher mortality with CHF or ischemic heart disease (1 & 2 year mortality rates 7% higher) (Besarab, A. NEJM, 1998)
- Higher rate of graft & fistula thrombosis (Besarab, A. NEJM, 1998)
- No differences in hospitalizations, MI or stroke (Besarab, A. NEJM, 1998)
- Higher risk of cerebrovascular events (Parfrey PS. Kidney Int 2005)

Meta-analysis Hgb > 12 vs <12 g/dl

Phrommintikul et al, Lancet 2007

- All Cause Mortality higher
 - p=0.031, RR 1.17
- Poorly controlled HTN higher
 - p=0.004, RR 1.27
- AV access thrombosis higher
 - p=0.0001, RR 1.34
- No difference in LV Mass or MI

Outcomes with near normal Hgb

CREATE – CV Risk Reduction by Early Anemia Treatment with Epoetin Beta

- 3 year study
- 603 pts
 - GFR 15-35 ml/min/1.73m²
 - Anemia 11-12.5g/dl

Drueke TB et al, NEJM. 2006

Create Results

- No difference in
 - CVD events
 - LVMI
- Increased general and mental health
- Increased quality of life
- Increased physical & social function
- Increased vitality

Outcomes with near normal Hgb

CHOIR –

Singh AK, et al. NEJM. 2006

- Open-labeled, multicenter
- 1432 patients CKD
 - GFR 15-50ml/min/1.72 m²
 - Hgb < 11 g/dl
- Target groups: Hgb 11.3 vs 13.5g/dl
- End points: all cause mortality or CV morbidity (MI, stroke, HF)

CHOIR Results

- 222 events occurred
 - Hgb 11.3 – 97 events
 - Hgb 13.5 – 125 events
- More (34%) events/higher probability of events in higher Hgb group
 - Hospitalizations for CHF (64 vs 47) p=0.07
 - Death (52 vs 36) p=0.07
 - Stroke p=0.98
 - MI p=0.78

ESA use in Malignancy

Randomized

goal Hgb 12-14g/dl with ESA vs placebo goal

1. BEST 939 women with breast CA
 - Overall survival 70% vs 76%
(Lizorin-Stones, et al., J Clin Oncol 2005)
2. ENHANCE men and women with advanced head/neck CA
 - progression free survival was less with ESA RR 1.62, p=0.0008
 - Overall survival less RR=1.39, p=0.02
(Henke, et al. Lancet 2007)

ESA in Malignancy

3. Trials with ESA's in cervical, gastric and small cell lung CA
 - 4 fold increase in VTE
(Littlewood et al., J Clin Oncol. 2001, O'DAC 2004, Vadhan-Raj, et al. Blood. 2004)

ESA in Malignancy

Meta-analysis of 12 randomized, controlled studies 2297 pts

- With intervention target Hgb \leq 11 g/dl
 - No sign. difference in mortality
 - Thromboembolic events were greater in ESA group
 - No sign. difference in deaths from thromboembolic events
 - Trend toward more favorable effect on tumor progression

Goals for treating anemia in ESRD

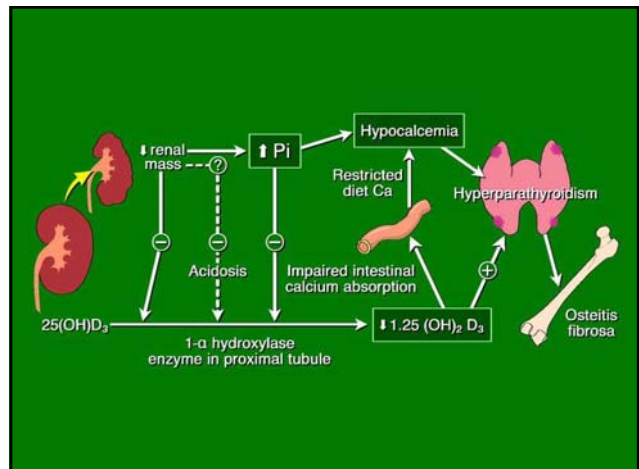
- Hgb 10-12g/dl
- With malignancy and ESRD/CKD, use the smallest dose to prevent transfusions

Uremic Bleeding Diathesis

- Decreased platelet adhesiveness
 - Abnormal factor VIII activity
- Gingival Changes
- Pale – anemia
 - Loss of demarcation of micro gingival junction
 - Bleeding – platelet dysfunction/abnl factor VIII

Metabolic Bone Disease in CKD

- Osteoporosis
- Osteomalacia
 - 1,25 vit D deficiency
 - increased osteoid
- Osteitis Fibrosa Cystica



Secondary hyperparathyroidism and oral disease

- Narrowing of pulp chamber
 - Direct correlation with time on dialysis
- Premature bone loss – jaw
 - Mandibular and maxillary fractures
- Mandibular Browns tumors
- Enlargement of skeletal base
- Tooth mobility

Orofacial features of secondary hyperparathyroidism

Proctor, R. et al. J Dent Res 2005

Bony features

- Demineralization
- Decreased
 - trabeculation
 - cortical bone thickness
- Ground-glass appearance
- Metastatic soft-tissue calcification
- Radiolucent Fibrocystic and giant cell lesions
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Tooth & Periodontium

- Delayed eruption
- Enamel hypoplasia
- Loss of lamina dura
- Widening of periodontal ligament
- Severe periodontal destruction
- Tooth mobility
- Drifting
- Pulp calcification
- Pulp narrowing

Vitamin D

- Improves BP
 - Down-regulates renin-angiotensin II production
- Decreases inflammation
 - Decreased glomerular immune deposits
 - Decreased TGF-beta expression
 - Decreased cellular cytokine production

Hyperparathyroidism (elevated Ca-Phos product) and Vitamin D deficiency

- Cardiovascular disease
 - HTN
 - LVH
 - CAD

Increased inflammation
Effect on oral disease ?
- Decreased survival

Dietary Restrictions in CKD

- Prevent fluid and Na overload: 90meq/day
- Prevent protein loading: 0.8-1g/kg/day (acidosis, increased phosphorus + uric acid)
- Prevent phosphorus retention: 1200mg/day
- Prevent hyperkalemia: 70meq/day
- Prevent unwanted weight loss: 35kcal/kg/day
- Prevent Ca depletion: 1-1.2grams/day

Dental management

- If on dialysis, coordinate with dialysis schedule
 - non-dialysis days
 - Alter anticoagulation with hemodialysis
- Adjust drug doses for renal function
 - Clearance of analgesics is decreased
 - Avoid meperidine, propoxyphene
 - Antibiotics
- NSAID – **caution** in CKD/ESRD
- SBE prophylaxis – follow current guidelines

Dental management

- Detailed assessment & good dental care
- Regular communication to Nephrologist
 - ❖ Avoid systemic complications
 - ❖ Avoid morbidity

Thank You