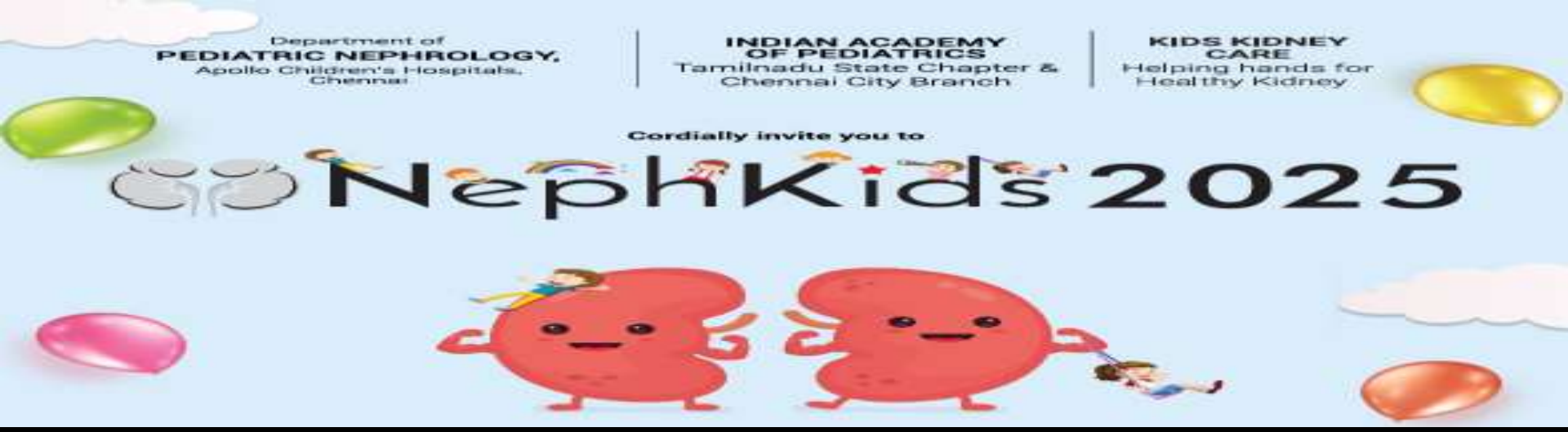

KIDIGO 2024: *Evaluation* and *Management* of CKD in children to improve care.

RAJIV SINHA

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INDEX CASE SCENARIO

- ✓ 2 yrs old boy with febrile UTI
- ✓ Dribbling of urine since early infancy
- ✓ H/O Recurrent UTI
- ✓ Ht: -2.9 SDS, Wt: – 2.4 SDS
- ✓ Creatinine 1.0 mg/dl
- ✓ USG: B/L hydroureteronephrosis with thickened bladder wall and significant post void residue

OBJECTIVES

NEW

KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

- To define / identify pCKD
- To understand the basic principles of pCKD management.

OBJECTIVE 1

To define / identify CKD

Is this child in CKD...

GFR

URINE ALB/PROTEIN

Cause

1.1.1 Detection of CKD

Practice Point 1.1.1.1: Test people at risk for and with chronic kidney disease (CKD) using both urine albumin measurement and assessment of glomerular filtration rate (GFR).

1.1.4 Evaluation of cause

Practice Point 1.1.4.2: Use tests to establish a cause based on resources available.

Is this child in CKD...

1.1.1 Detection of CKD

Practice Point 1.1.1.1: Test people at risk for and with chronic kidney disease (CKD) using both urine albumin measurement and assessment of glomerular filtration rate (GFR).

Practice Point 1.3.1.4: In children, obtain a first morning urine sample for initial testing of albuminuria and proteinuria (in descending order of preference):
(i) Both urine PCR and urine ACR,
(ii) Reagent strip urinalysis for total protein and for albumin with automated reading, or
(iii) Reagent strip urinalysis for total protein and for albumin with manual reading.
CONFIRM REAGENT STRIP +VE WITH QUANTITATIVE METHOD

Table 18 | Impact of albuminuria/proteinuria on CKD progression in pediatrics

Study	Impact of albuminuria/proteinuria
ESCAPE[228]	A 50% reduction of proteinuria within the first 2 months of treatment initiation more than halved the risk of progression of kidney disease over 5 years.
Gluck *et al.*[225]	In a cohort of over 7 million children, 0.1% had CKD G2 or higher. The relative risk of CKD progression, defined as reaching CKD G5 or having a 50% decline in eGFR, was doubled for those who had ≥1+ proteinuria on dipstick without hypertension and was quadrupled for those with proteinuria and hypertension over a median follow-up of 5 years.
CKiD[393]	ACR of >300 mg/g (>30 mg/mmol) was associated with an 84% higher risk of disease progression over a median follow-up of 3 years compared with an ACR of 30 mg/g (3 mg/mmol). PCR of 630 mg/g (71 mg/mmol) was associated with an 87% higher risk of disease progression compared with a PCR of 140 mg/g (16 mg/mmol).
4C study[394,395]	Each log higher value of ACR was associated with a 50% higher risk of kidney failure or a 50% decline in eGFR over a median follow-up of 3 years. A 115% increase in albuminuria was associated with faster disease progression after cessation of RASi in children with advanced CKD.
ItalKids[396]	Significantly slower decline in creatinine clearance in people with baseline PCRs of <200 mg/g (<23 mg/mmol) and 200–900 mg/g (23–102 mg/mmol) when compared with those with a PCR of >900 mg/g (>102 mg/mmol). This translated to higher rates of kidney survival over 5 years in the lower proteinuria groups: 97% and 94% vs. 45%.
Indian cohort[397]	CKD progression risk within 2 years was tripled for those with proteinuria >2000 mg/g (226 mg/mmol).
Japanese cohort[398]	Risk of CKD progression was 7 times as high for those with proteinuria >2000 mg/g (>226 mg/mmol) compared with those with lower proteinuria concentrations after adjustment for CKD stage, hypertension, sex, and age.

ACR, albumin-to-creatinine ratio; CKD, chronic kidney disease; CKiD, chronic kidney disease in children; eGFR, estimated glomerular filtration rate; ESCAPE, Effect of Strict Blood Pressure Control and ACE Inhibition on the Progression of CRF in Pediatric Patients; PCR, protein-to-creatinine ratio; RASi, renin-angiotensin-system inhibitors.

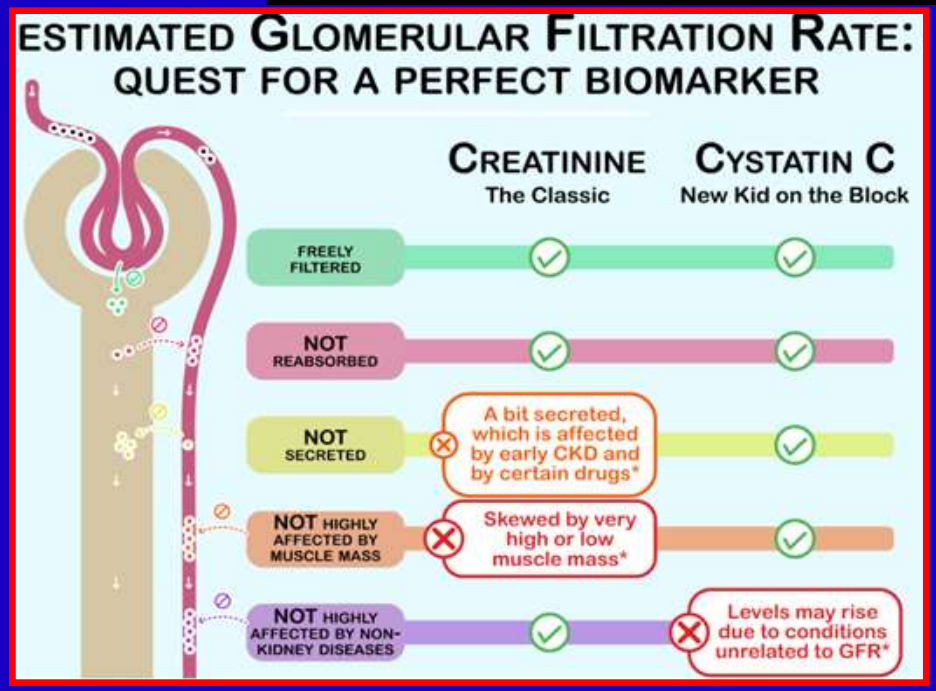
Is this child in CKD...

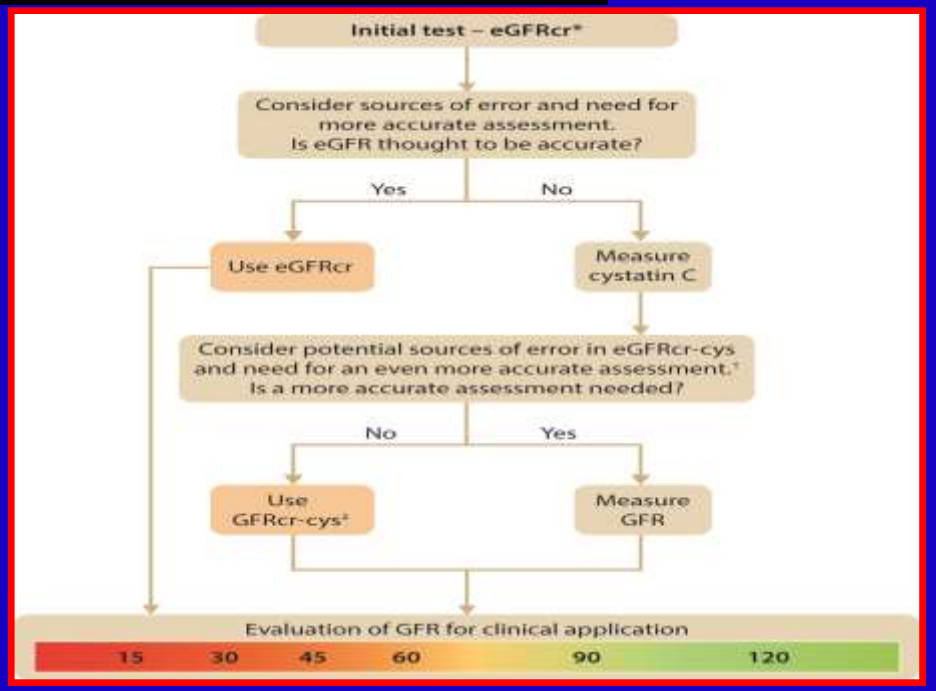
1.1.1 Detection of CKD

Practice Point 1.1.1.1: Test people at risk for and with chronic kidney disease (CKD) using both urine albumin measurement and assessment of glomerular filtration rate (GFR)

Practice Point 1.2.2.1: Use serum creatinine (SCr) and an estimating equation for initial assessment of GFR.

- **Practice Point 1.2.3.3:** Laboratories measuring creatinine in infants or small children must ensure their ***QUALITY CONTROL PROCESS*** include the lowest end of the expected range of values for the group of interest.
- **Practice Point 1.2.3.4:** Consider the consistent use of ***ENZYMATIC CREATININE ASSAYS*** in children, given the higher relative contribution of non-creatinine chromogens to measured creatinine in children when using the Jaffe assay, and the high prevalence of icteric and hemolyzed samples in the neonatal period.





Is this child in CKD...

1.1.1 Detection of CKD

Practice Point 1.1.1.1: Test people at risk for and with chronic kidney disease (CKD) using both urine albumin measurement and assessment of glomerular filtration rate (GFR)

Practice Point 1.2.4.3: Estimate GFR in children using validated equations that have been developed or validated in comparable populations.

Table 14 | Validated GFR estimating equations

Marker	Equation name and year	Age	Variables	Development populations
Creatinine	CKD-EPI 2009[238]	≥18; modification CKD-EPI 40 for pediatric available	Developed using A, S, R but reported not using the Black race coefficient, A, S, R (NB)	8254 Black and NB individuals from 10 studies in the United States and Europe[a]
	CKiD U25 2021[239]	1–25	A, S, height	928 children with CKD in the United States and Canada
	CKD-EPI 2021[147]	≥18	A, S	8254 Black and NB individuals from 10 studies in the United States and Europe[a]
	EKFC 2021[240]	2–100	A, S, European Black and NB specific Q-value; separate Q-values for Africa vs. Europe	mGFR vs. SCr (11,251 participants in 7 studies in Europe and 1 study from the United States) Normal GFR from 5482 participants in 12 studies of kidney donor candidates (100% Caucasian) European NB Q from 83,157 laboratory samples (age 2–40 years) in 3 European hospital clinical laboratories; European Black Q-value (N = 90 living kidney donors from Paris); African Black Q-value (N = 470 healthy individuals from République Démocratique de Congo); All Q-values developed in cohorts independent for EKFC development and validation
	Lund Malmö Revised 2014[241]		A, S	3495 GFR examinations from 2847 adults from Sweden referred for measurement of GFR
	CKD-EPI 2009 Modified for China 2014[b,242]	≥18	A, S	589 people with diabetes from the Third Affiliated Hospital of Sun Yat-sen University, China
	CKD-EPI 2009 Modified for Japan 2016[b,83]	≥18	A, S	413 hospitalized Japanese people in 80 medical centers
	CKD-EPI 2009 Modified for Pakistan 2013[b,235]	≥18	A, S	542 randomly selected low- to middle-income communities in Karachi and 39 people from the kidney clinic

Recommendation 1.2.2.1: We recommend using eGFRcr-cys in clinical situations when eGFRcr is less accurate and GFR affects clinical decision-making (Table 8[d]) (*1C*).

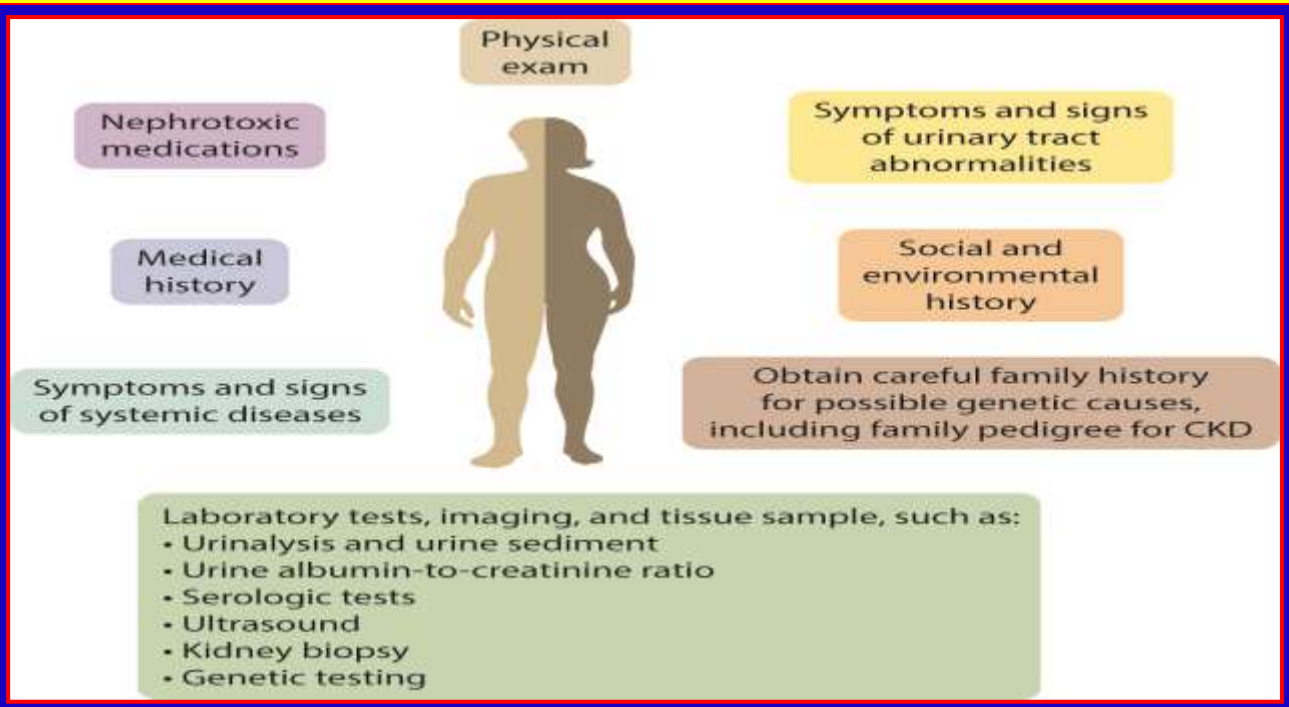
Is this child in CKD...

1.1.4 Evaluation of cause

Practice Point 1.1.4.2: Use tests to establish a cause based on resources available.

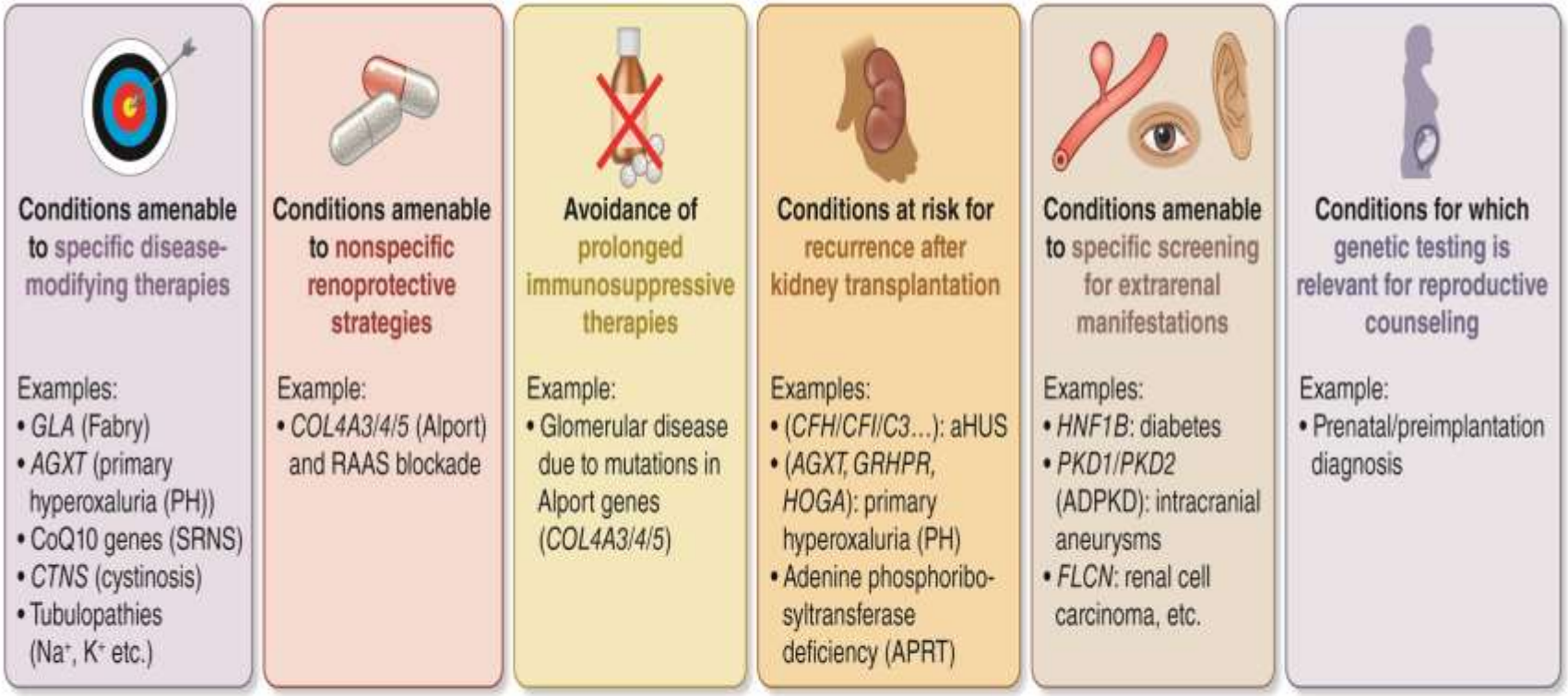
Practice Point 1.1.4.1: Establish the cause of CKD using clinical context, personal and family history, social and environmental factors, medications, physical examination, laboratory measures, imaging, and genetic and pathologic diagnosis.

Practice Point 1.1.4.2: Use tests to establish a cause based on resources available.



Recommendation 1.1.4.1: We suggest performing a kidney biopsy as an acceptable, safe, diagnostic test to evaluate cause and guide treatment decisions when clinically appropriate (*2D*).

Role of Genetics



Is this child in CKD...

INDEX CASE SCENARIO

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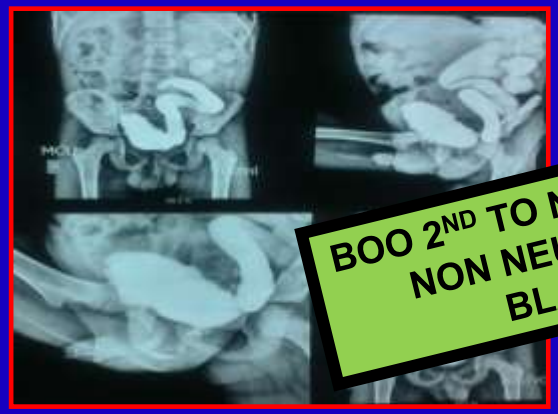
- ✓ USG: B/L hydroureteronephrosis with thickened bladder wall and significant post void residue

eGFR = $\frac{k \times Ht}{Cr}$ = 58

Urine PCR= 0.9 mg/mg

Urine ACR = 250 mg/gm

Aetiology



BOO 2ND TO NEUROGENIC-NON NEUROGENIC BLADDER

Is this child in CKD....

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

1.1: DEFINITION OF CKD

1.1.1: CKD is defined as abnormalities of kidney structure or function, present for >3 months, with implications for health. (*Not Graded*)

Kidney International Supplements (2013) **3**, v

Is this child in CKD....

INDEX CASE SCENARIO

- ✓ 2 yrs old boy with febrile UTI
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Newborns who clearly have kidney disease (e.g., severe congenital malformations of the kidney and urinary tract) do not need to wait 3 months to confirm CKD.

Numerous kidney disorders in children that may present with tubular dysfunction (e.g., Bartter's and Dent disease) rather than decreased GFR or albuminuria.

Practice Point 1.1.3.1: Proof of chronicity (*duration of a minimum of 3 months*) can be established by:

(i) Review of past measurements/estimations of GFR;
(ii) Review of past measurements of albuminuria or proteinuria and urine microscopic examinations;
(iii) Imaging findings such as reduced kidney size and reduction in cortical thickness;
(iv) Kidney pathological findings such as fibrosis and atrophy;
(v) Medical history, especially conditions known to cause or contribute to CKD;
(vi) Repeat measurements within and beyond the 3-month point.

Staging of CKD

CURRENT CHRONIC KIDNEY DISEASE (CKD) NOMENCLATURE USED BY KDIGO

CKD is defined as abnormalities of kidney structure or function, present for a minimum of 3 months, with implications for health. CKD is classified based on Cause, Glomerular filtration rate (GFR) category (G1–G5), and Albuminuria category (A1–A3), abbreviated as CGA.

KDIGO: Prognosis of CKD by GFR and albuminuria categories

GFR categories (ml/min/1.73 m²) Description and range			Persistent albuminuria categories Description and range		
			A1	A2	A3
			Normal to mildly increased	Moderately increased	Severely increased
			<30	30–300 mg/g 3–30 mg/mmol	>300 mg/g >30 mg/mmol
G1	Normal or high	≥90			
G2	Mildly decre				
G3a	Mildly to moderately decreas				
G3b	Moderately to severely decreased	30–44			
G4	Severely decreased	15–29			
G5	Kidney failure	<15			

G3a A2

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red: very high risk. GFR, glomerular filtration rate.

CKD risk predication

Recommendation 2.2.1: In people with CKD G3–G5, we recommend using an externally validated risk equation to estimate the absolute risk of kidney failure (1A).

Pediatric Chronic Kidney Disease Risk Calculator

NATIONAL KIDNEY FOUNDATION

Among patients with the same profile:

50% will have RRT or half of current GFR by **greater than 10 years**

25% will have RRT or half of current GFR by **7 years**

10% will have RRT or half of current GFR by **4 years 9 months**

Age:

Sex:

CKD diagnosis:

GFR:

Hyperte

H

Dy

Chan **rom last clinic visit:**

Change **ia from last clinic visit:**

Change of ACEi/ARB medication use from last clinic visit:

Aetiologies

ISPN CKD registry

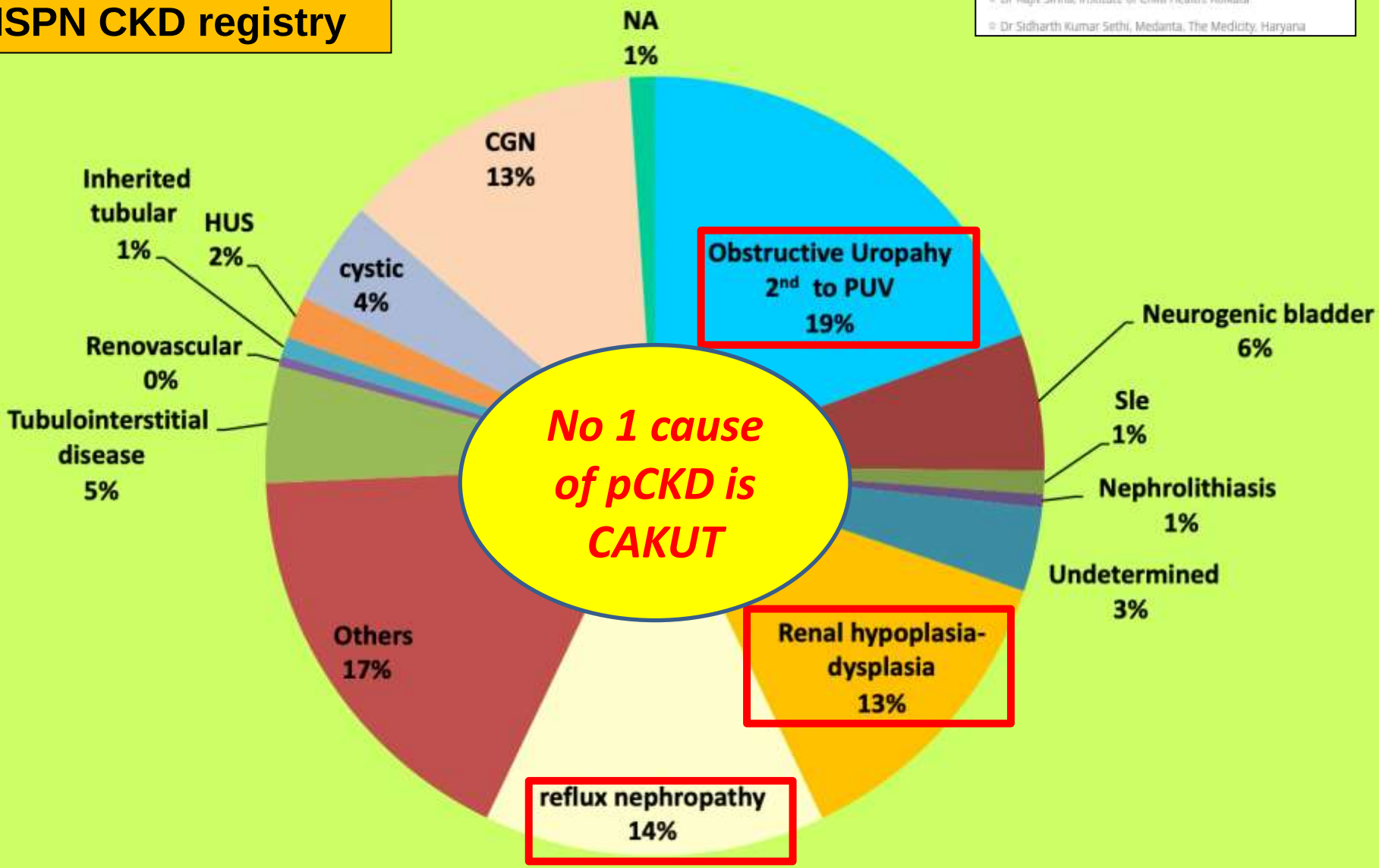
COMMITTEE

CONVENER

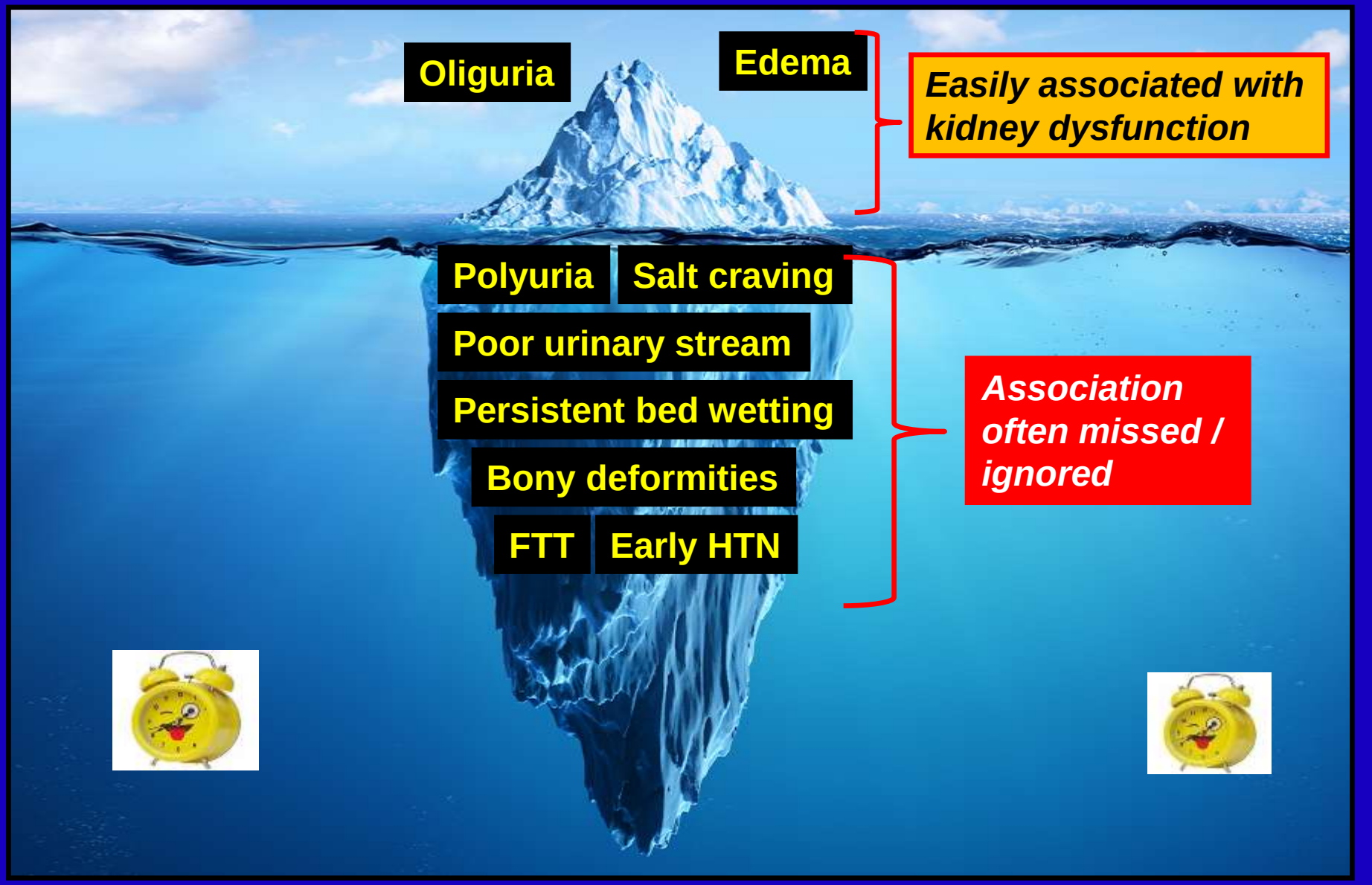
- Dr Arvind Bagga, All India Institute of Medical Sciences, New Delhi

CO-CONVENER

- Dr Rajiv Sinha, Institute of Child Health, Kolkata
- Dr Sidharth Kumar Sethi, Medanta, The Medicity, Haryana



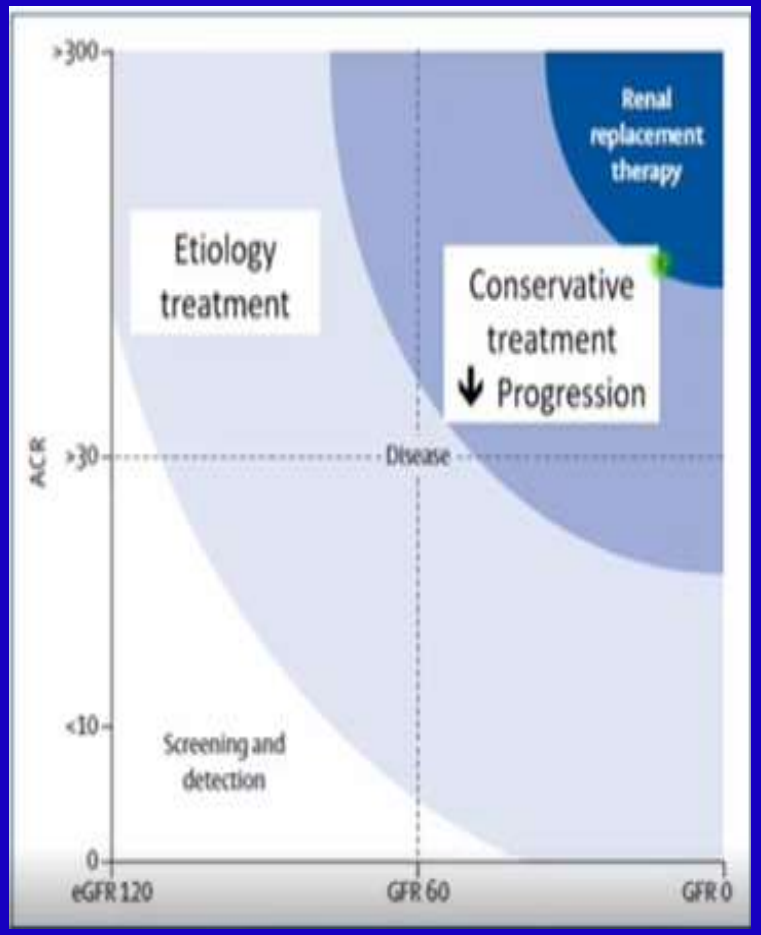
pCKD is often diagnosed late?



Late diagnosis …

Late diagnosis can result in:

- **Death from some of the preventable complications of CKD.**
- **Denial of measures with potential of reducing rate of CKD progression.**
- **Lack of adequate time to prepare socially / mentally / financially for RRT.**



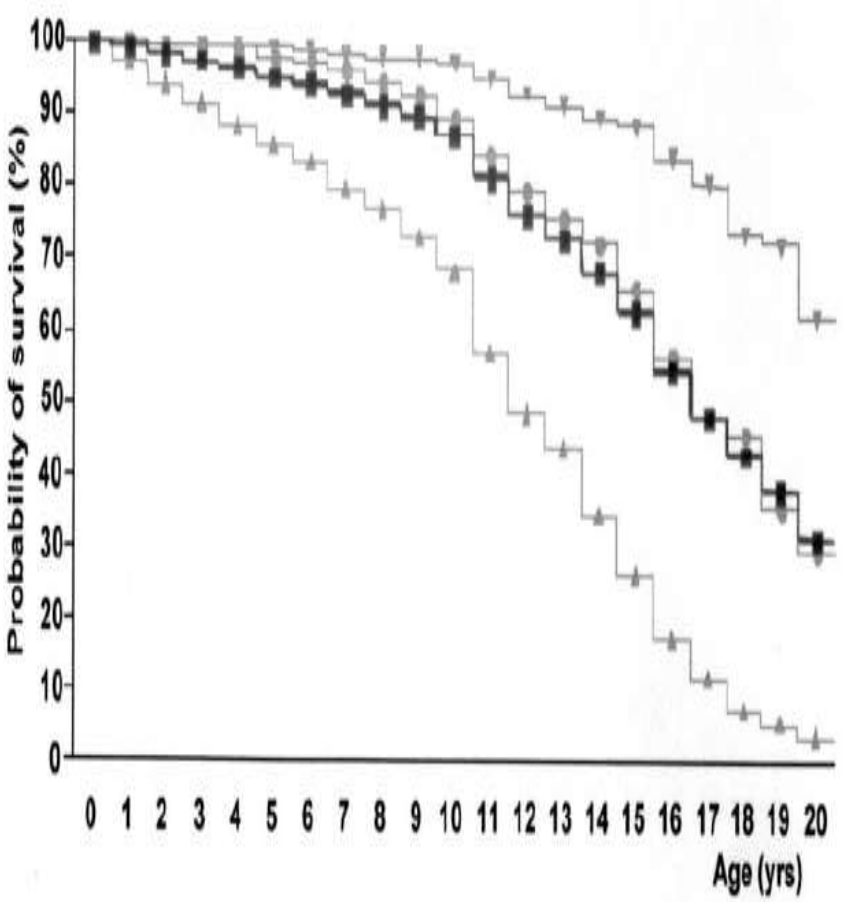
www.thelancet.com/lancetgh Vol 4 May 2016

OBJECTIVE 2

To understand the basic principles of managing pCKD

Basic principles of pCKD management....

Fig 2. Estimated kidney survival in children with CRF by age. Overall population (n = 1197; —■—); patients with baseline creatinine clearance <25 mL/min (n = 315; —▲—); 25–50 mL/min (n = 419; —●—); 51–75 mL/min (n = 463; —▼—).



Basic principles of pCKD management....

Step 1: Treat any reversible conditions

- **Prevent /treat hypovolemia**
- **Treat any infection**
- **Stop / avoid nephro-toxic agents**
- **Relieve obstruction**

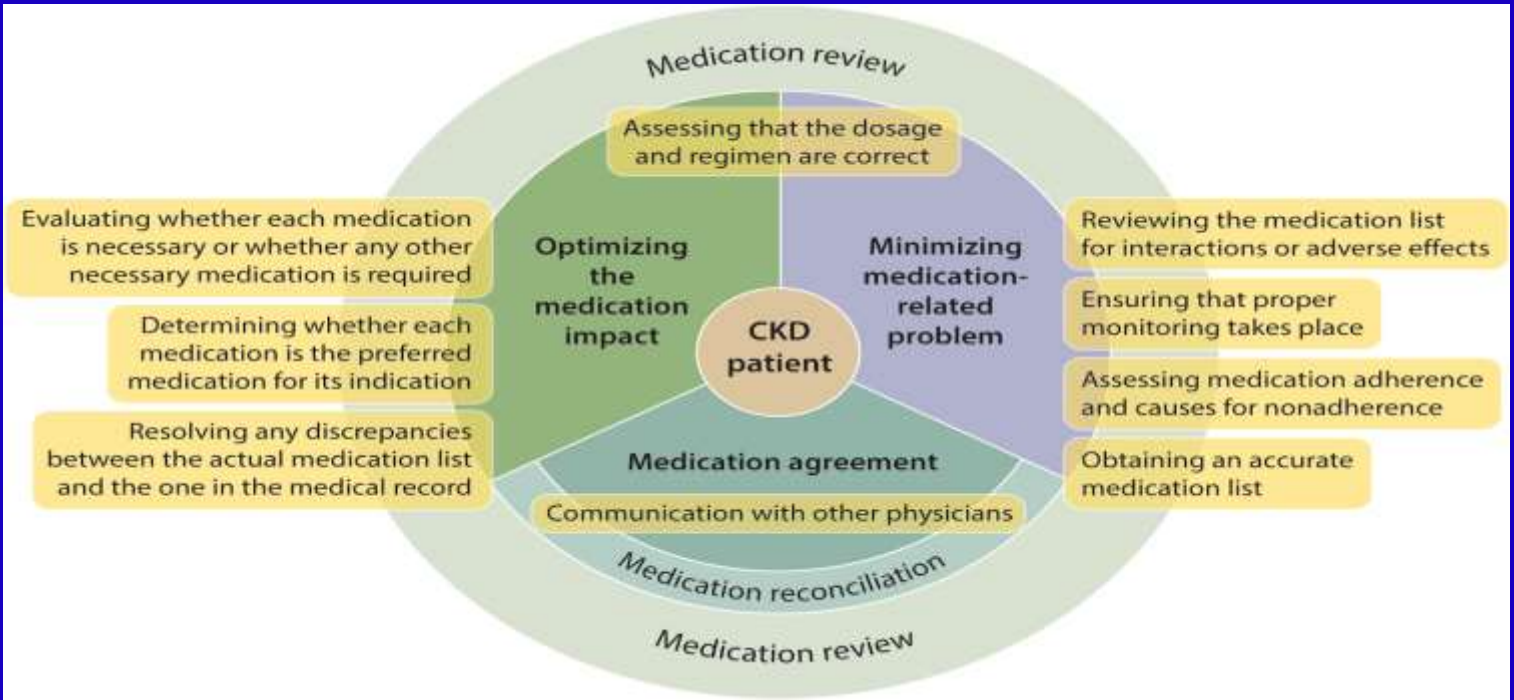
Practice Point 3.1.1: Treat people with CKD with a comprehensive treatment strategy to reduce risks of progression of CKD and its associated complications.

CKD and other medications

Practice Point 4.1.1: People with CKD may be more susceptible to the nephrotoxic effects of medications. When prescribing such medications to people with CKD, always consider the benefits versus potential harms.

Practice Point 4.1.2: Monitor eGFR, electrolytes, and therapeutic medication levels, when indicated, in people with CKD receiving medications with narrow therapeutic windows, potential adverse effects, or nephrotoxicity, both in outpatient practice and in hospital settings.

Practice Point 4.1.3: Review and limit the use of over-the-counter medicines and dietary or herbal remedies that may be harmful for people with CKD.



DRUG STEWARDSHIP

Basic principles of pCKD management....

Step 2: Slow the progression of the disease

Step 1: Treat any reversible conditions

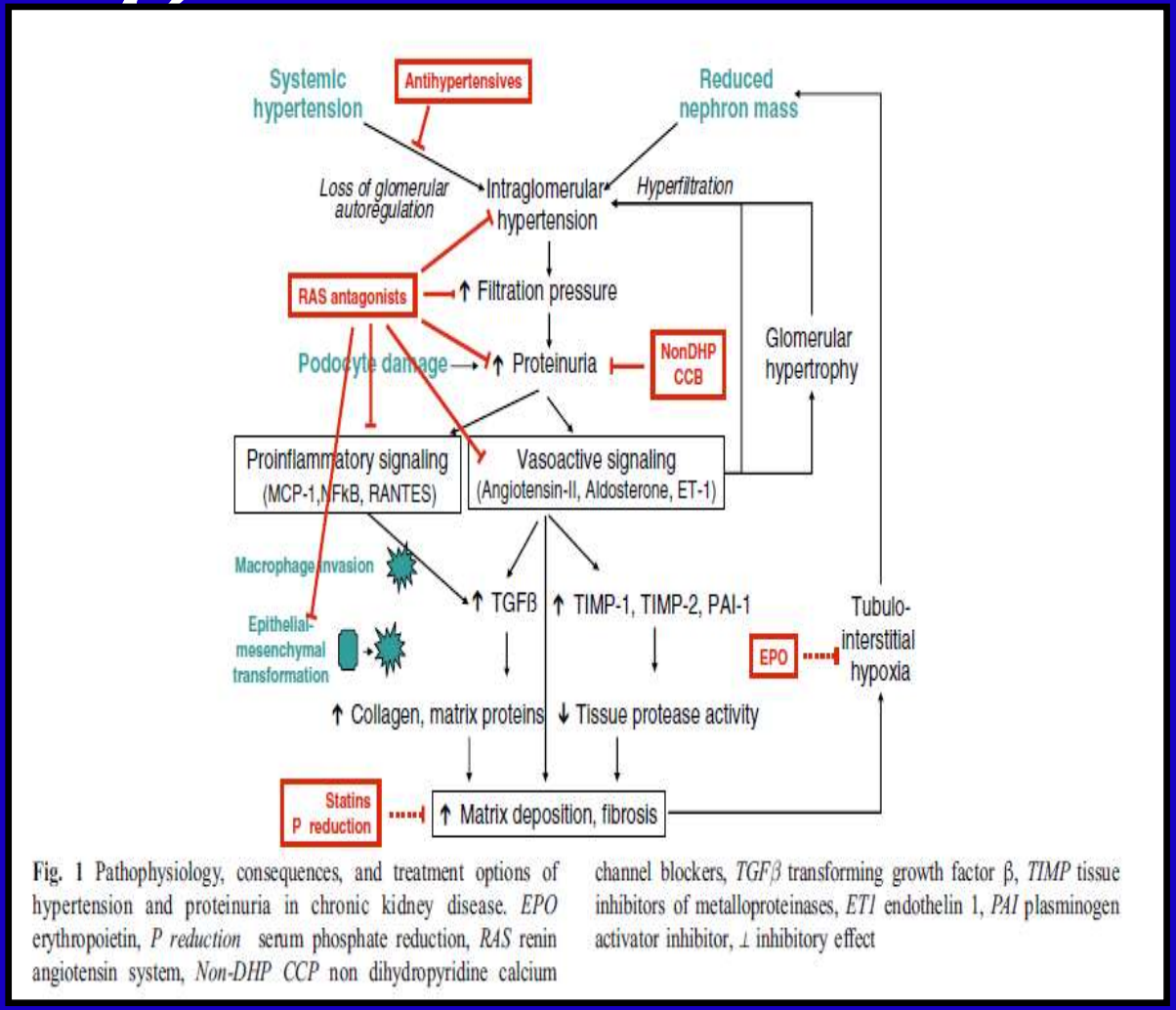


Fig. 1 Pathophysiology, consequences, and treatment options of hypertension and proteinuria in chronic kidney disease. *EPO* erythropoietin, *P reduction* serum phosphate reduction, *RAS* renin angiotensin system, *Non-DHP CCP* non dihydropyridine calcium channel blockers, *TGFβ* transforming growth factor β, *TIMP* tissue inhibitors of metalloproteinases, *ET1* endothelin 1, *PAI* plasminogen activator inhibitor, ⊥ inhibitory effect

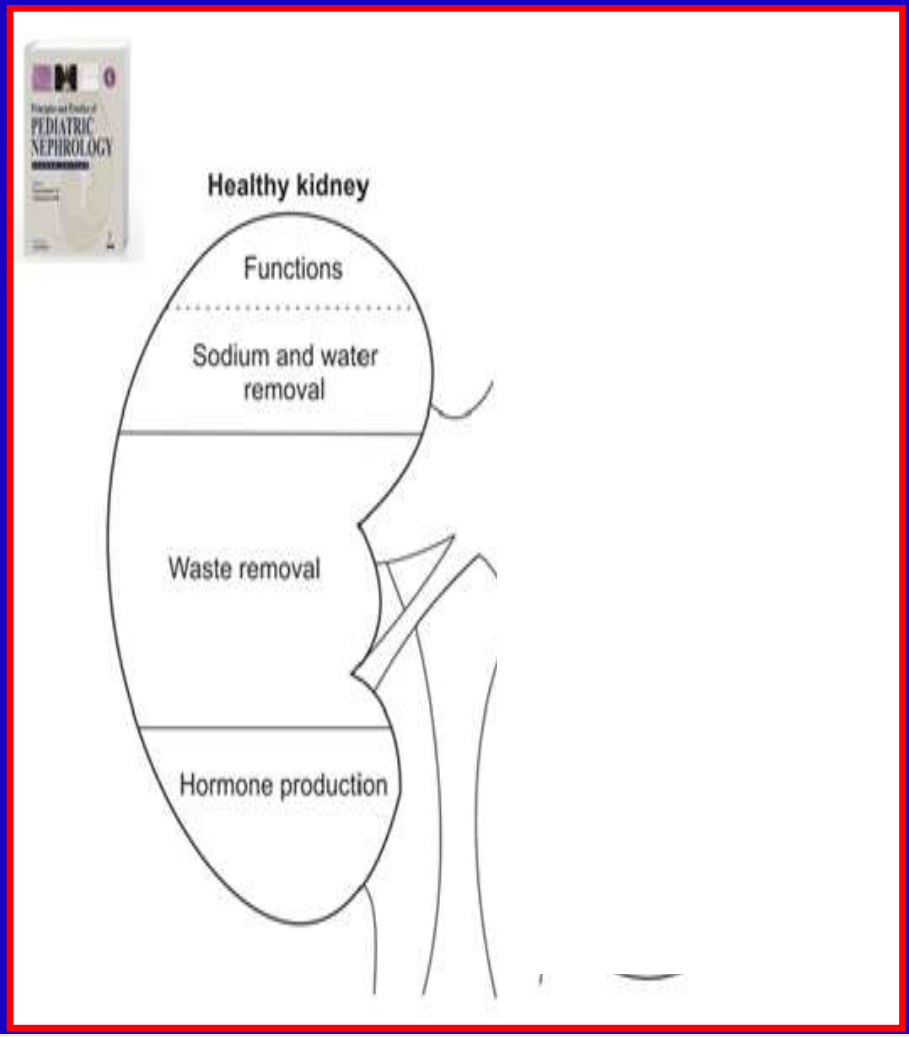
Practice Point 3.1.1: Treat people with CKD with a comprehensive treatment strategy to reduce risks of progression of CKD and its associated complications.

Basic principles of pCKD management....

Step 3: Anticipating / preventing / treating complications

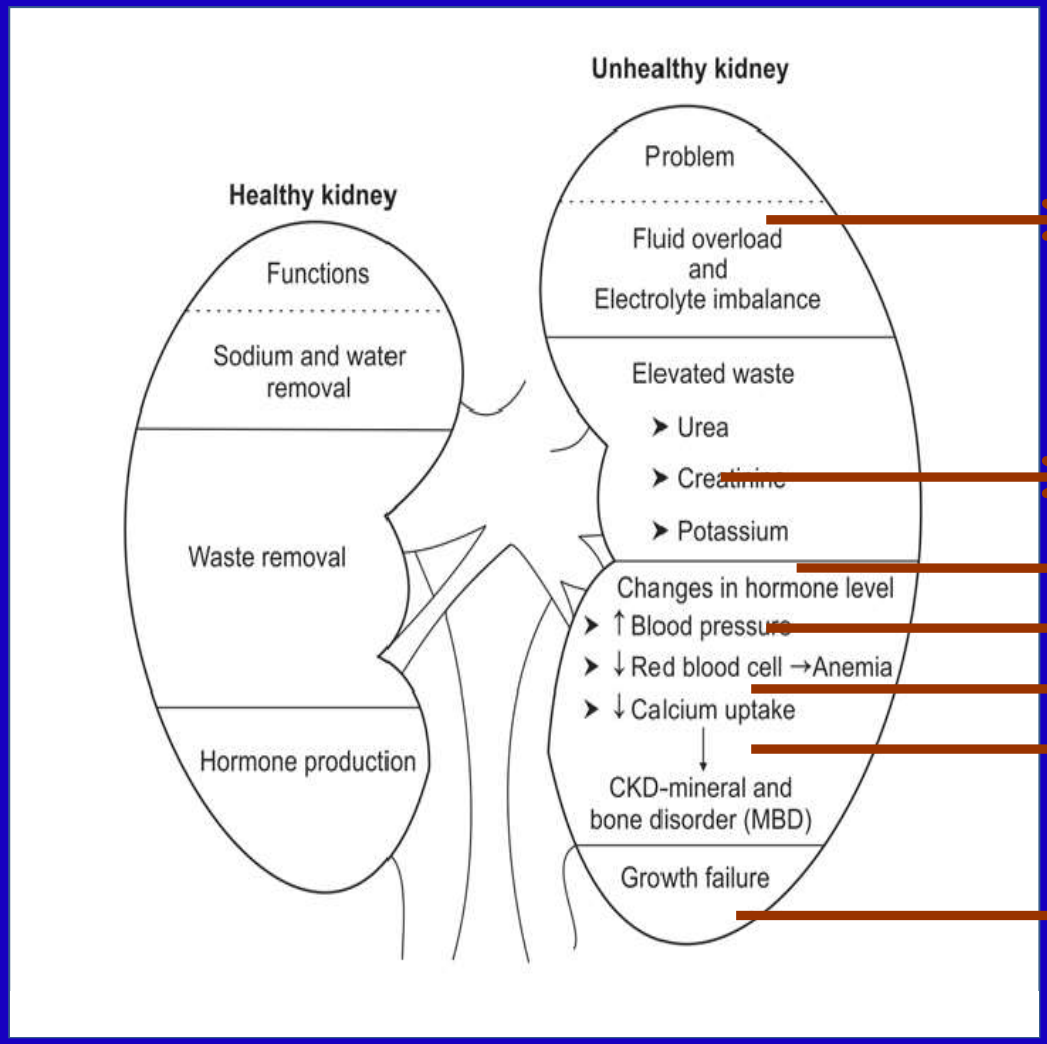
Step 2: Slow the progression of the disease

Step 1: Treat any reversible conditions



Practice Point 3.1.1: Treat people with CKD with a comprehensive treatment strategy to reduce risks of progression of CKD and its associated complications.

Basic principles of pCKD management....



- ***Diet / fluid modification***
- ***Diuretic***
- ***Bicarbonate supp Potassium binders***
- ***RRT***

- ***Vit D / Active vit D***
- ***Anti-HTN***
- ***Iron / Erythropoietin***
- ***Phosphate binders / restriction***

- ***Nutrition***
- ***Growth hormone***

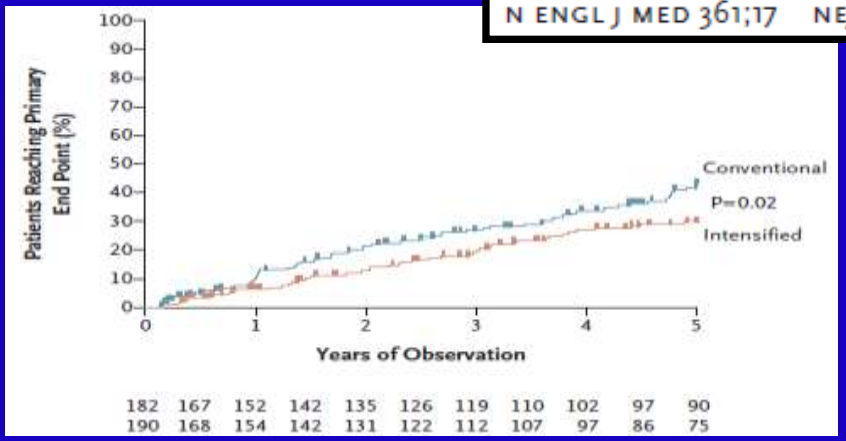
Post diagnosis of CKD can we do anything to slow the progressive decline in kidney function?

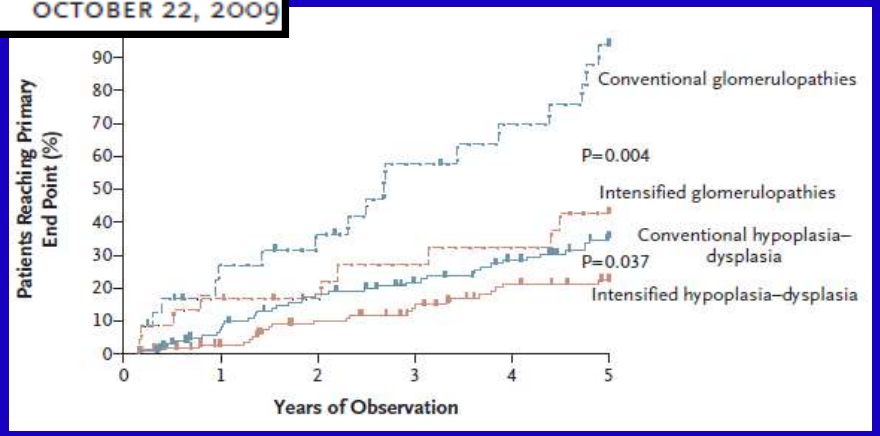
EVIDENCE

Strict Blood-Pressure Control and Progression of Renal Failure in Children

The ESCAPE Trial Group*

N ENGL J MED 361;17 NEJM.ORG OCTOBER 22, 2009





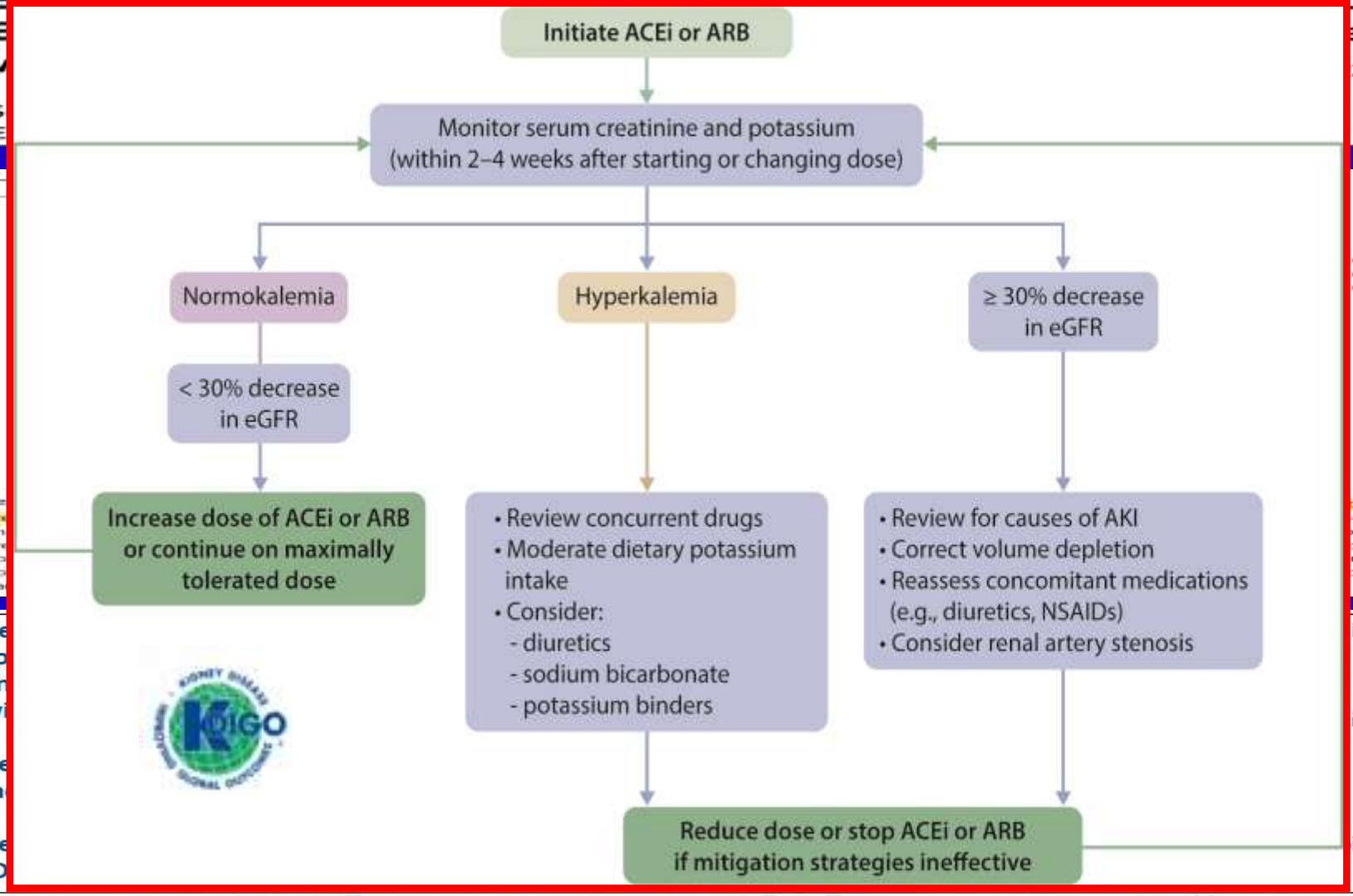
Recommendation 3.4.2: We suggest that in children with CKD, 24-hour mean arterial pressure (MAP) by **ambulatory blood pressure monitoring** (ABPM) should be lowered to <50th percentile for age, sex, and height (2C).

Practice Point 3.4.2: Monitor BP once a year with ABPM and every 3–6 months with standardized auscultatory office BP in children with CKD.

Practice Point 3.4.3: In children with CKD, when ABPM is not available, it is reasonable to target manual auscultatory office SBP, obtained in a protocol-driven standardized setting, of 50th–75th percentile for age, sex, and height unless achieving this target is limited by signs or symptoms of hypotension.

Post diagnosis of CKD can we do anything to slow the progressive decline in kidney function?

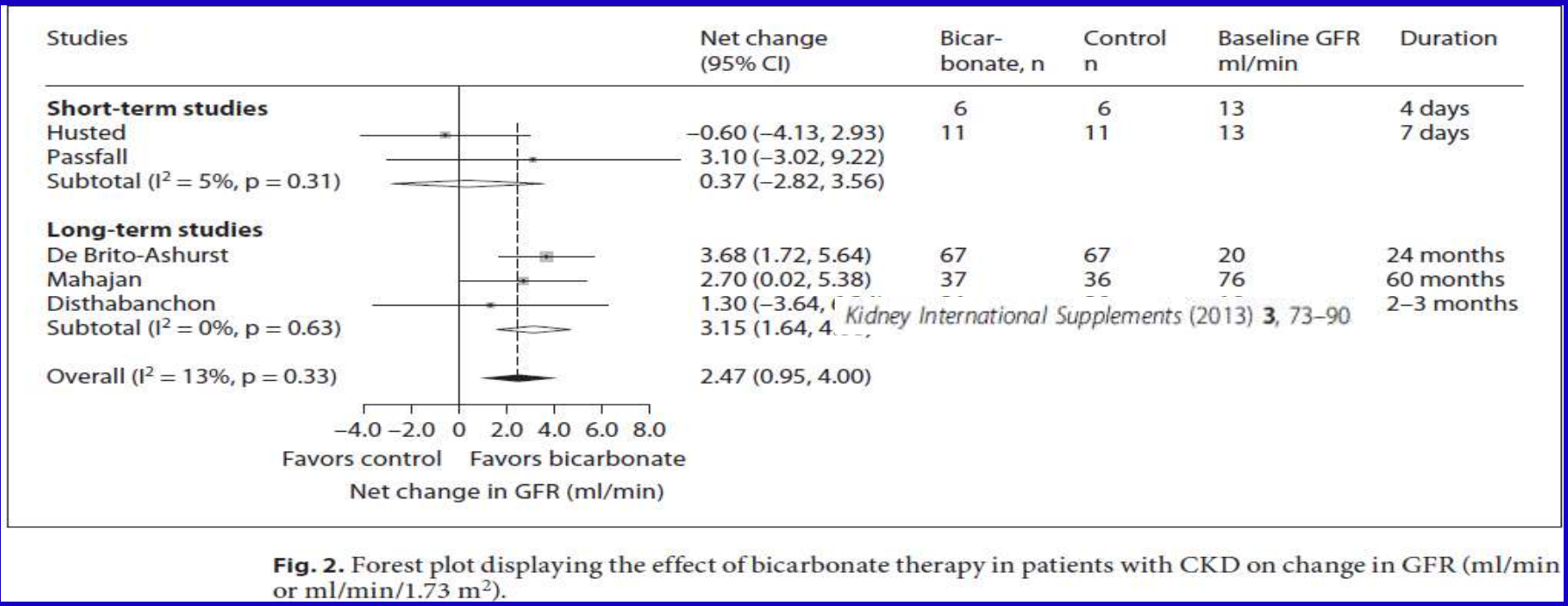
EVIDENCE



Post diagnosis of CKD can we do anything to slow the progressive decline in kidney function? *EVIDENCE*

Practice Point 3.10.1: In people with CKD, consider use of pharmacological treatment with or without dietary intervention to prevent development of acidosis with potential clinical implications.

Short- and Long-Term Effects of Alkali Therapy in Chronic Kidney Disease: A Systematic Review



Kidney International Supplements (2013) **3**, 73–90

Fig. 2. Forest plot displaying the effect of bicarbonate therapy in patients with CKD on change in GFR (ml/min or ml/min/1.73 m²).

Am J Nephrol 2012;35:540–547

Post diagnosis of CKD can we do anything to slow the progressive decline in kidney function?

EVIDENCE

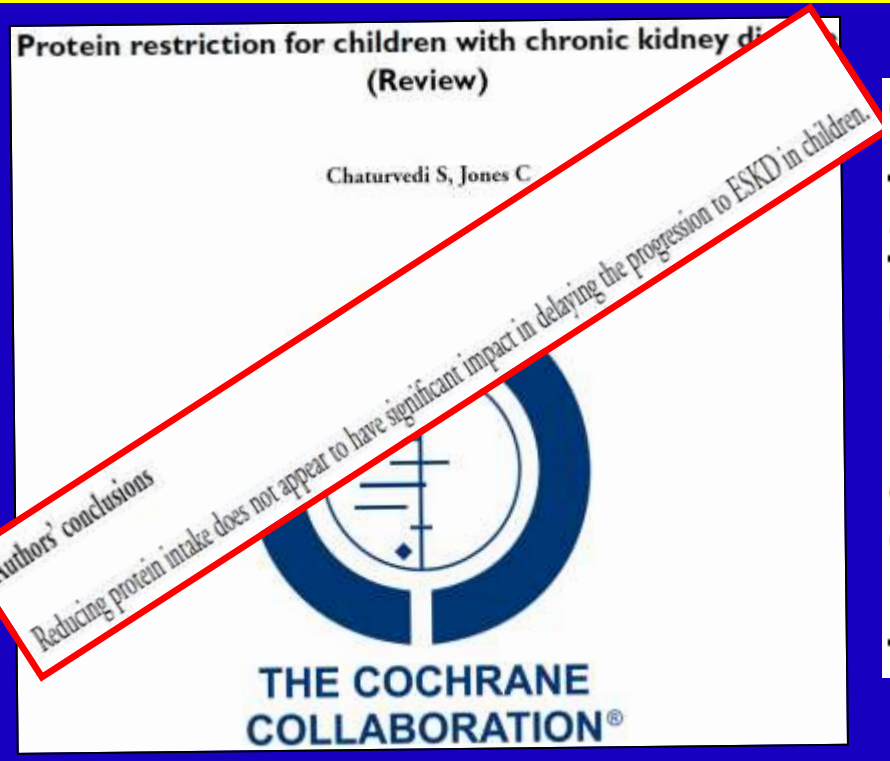


Table 22 | Age-based sodium intake recommendations[495]

Age	Recommended adequate sodium intake (g/d)
0–6 mo	0.110
7–12 mo	0.370
1–3 yr	0.370
4–8 yr	1.0
9–13 yr	1.2
14–70 yr	1.5

Practice Point 3.3.1.4: Do not restrict protein intake in children with CKD due to the risk of growth impairment. The target protein and energy intake in children with CKD G2–G5 should be at the upper end of the normal range for healthy children to promote optimal growth.

Practice Point 3.3.2.2: Follow age-based Recommended Daily Intake when counseling about sodium intake for children with CKD who have systolic and/or diastolic blood pressure >90th percentile for age, sex, and height.

Post diagnosis of CKD can we do anything to slow the progressive decline in kidney function?

EVIDENCE

Kidney360 Publish Ahead of Print, published on May 20, 2020 as doi:10.34067/KID.0000852020

Anemia and Incident End-Stage Renal Disease

Santosh L. Saraf,[1] Jesse Y. Hsu,[2] Ana C. Ricardo,[1] Rupal Mehta,[3,6] Jing Chen,[4] Teresa K. Chen,[5] Michael J. Fischer,[1,6,7] Lee Hamm,[4] James Sondheimer,[8] Matthew R. Weir,[9] Xiaoming Zhang,[2] Myles Wolf,[10] James P. Lash,[1] on behalf of the CRIC Investigators*

Figure 3. Risk of Incident ESRD by Decile of Hemoglobin Concentration

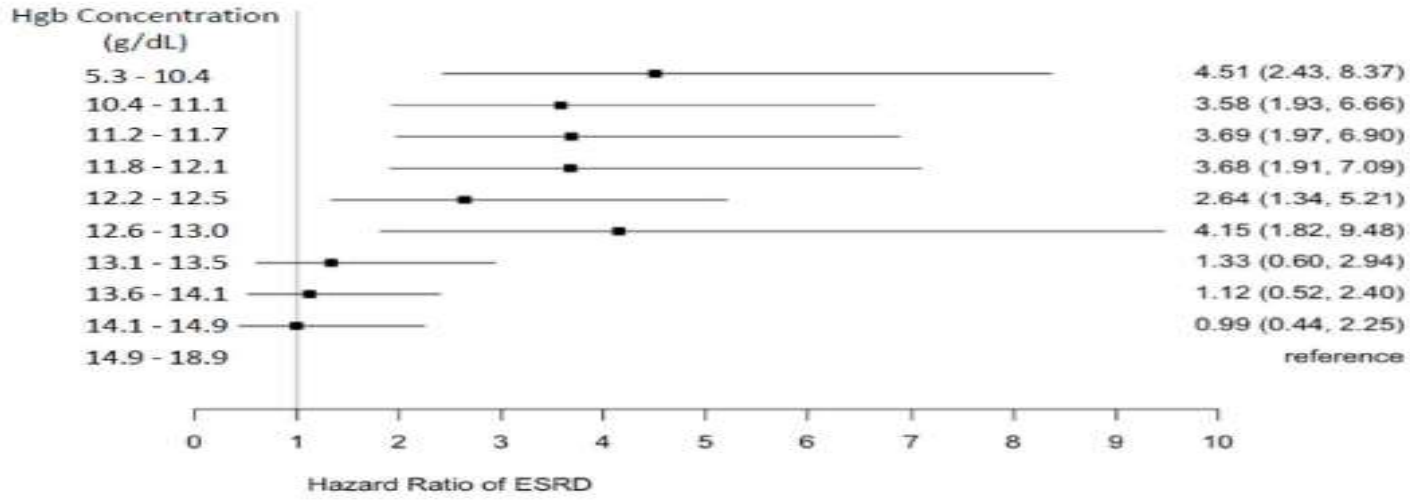
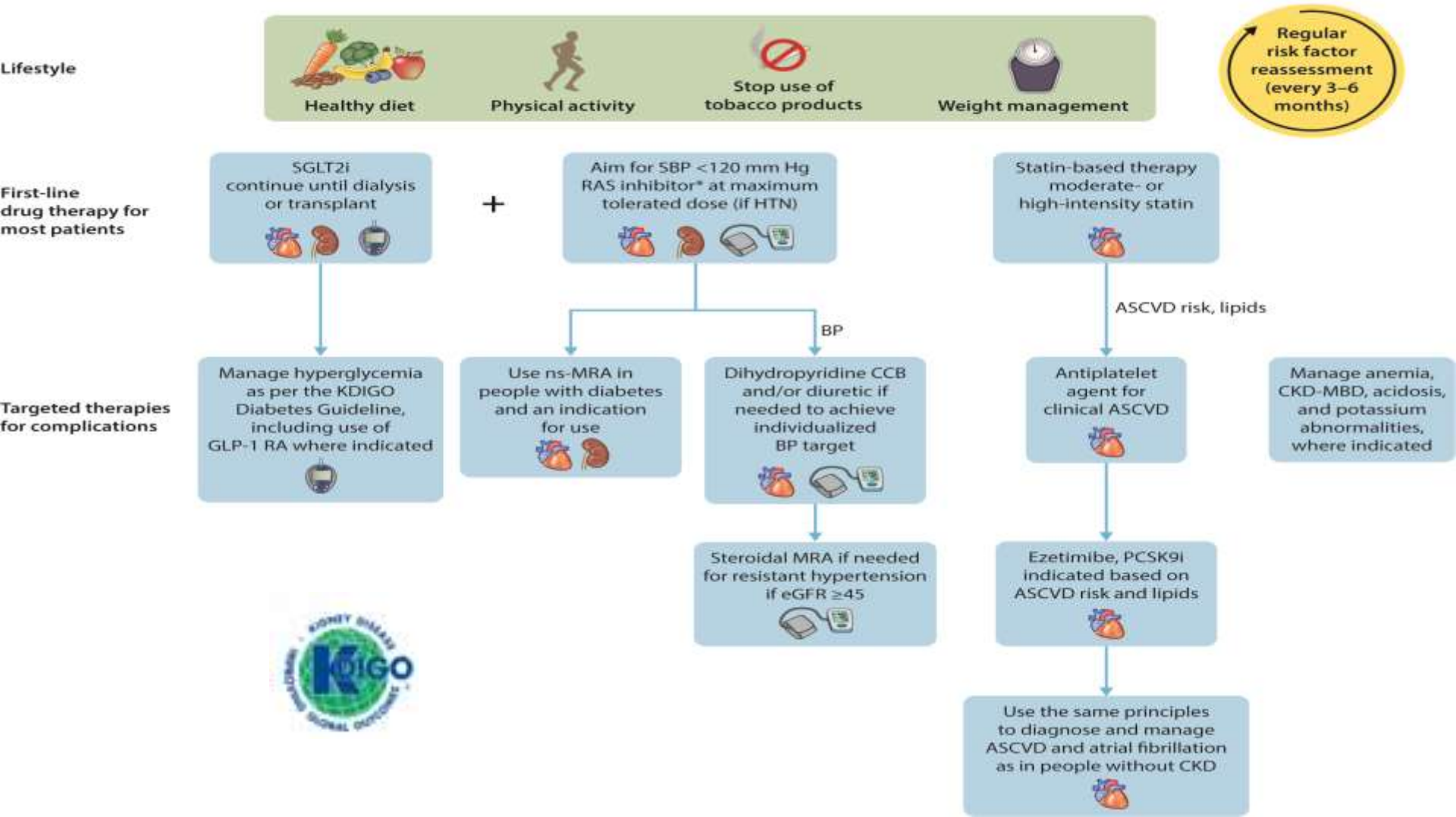


Figure 3. In multivariable models using the tenth decile as referent, a hemoglobin of less than 13.1 g/dL was associated with a higher risk of incident ESRD.

Target Hb > 2 yrs= 11 to 12 g/dl
< 2 yrs = 10.5 to 11.5 g/dl

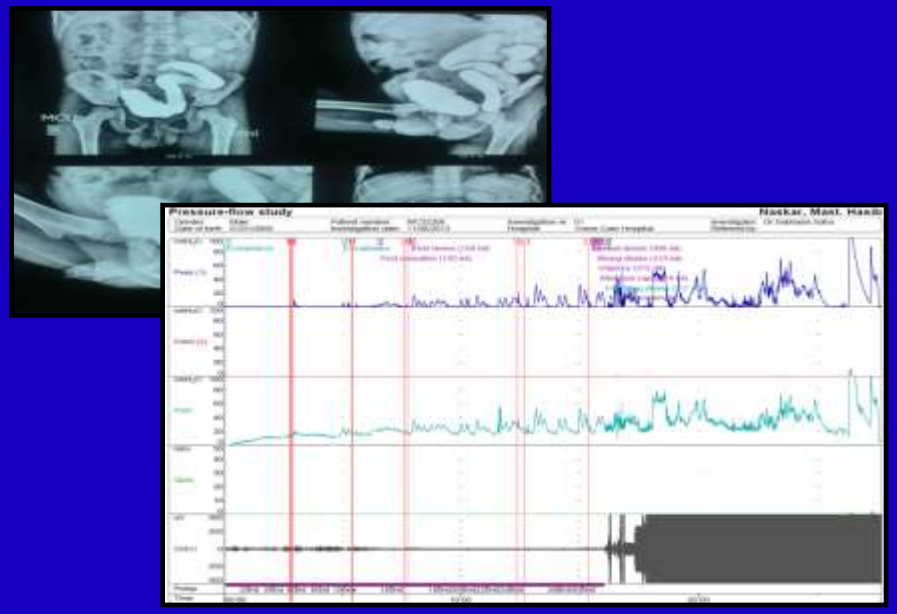
→ ***Nutrition, Iron, Epo***

CKD T/t and Risk Management



REMEMBERING THE "LESSONS"
Case Scenario 1

✓T/t for urosepsis and put on bladder drainage →



Step 3: Anticipating / preventing / treating complications

Step 2: Slow theprogression of the disease

Step 1: Treat any reversible conditions

✓ Started on regular CIC & oxybutanin

✓ Initiated regular CKD Mx

✓ Creatinine dropped to 1.9 and at 3 yrs follow up is 1.5 mg/dl

When to refer?

Practice Point 5.1.2: Refer children and adolescents to specialist kidney care services in the following circumstances:

- an ACR of 30 mg/g (3 mg/mmol) OR a PCR of 200 mg/g (20 mg/mmol) or more, confirmed on a repeat first morning void sample, when well and not during menstruation,
- persistent hematuria,
- any sustained decrease in eGFR,
- hypertension,
- kidney outflow obstruction or anomalies of the kidney and urinary tract,
- known or suspected CKD, or
- recurrent urinary tract infection.

'Now, don't panic, but I'm referring you to Dr. Jekyll.'

5.3.1 Transition from pediatric to adult care

5.3.1.1 Pediatric providers

Practice Point 5.3.1.1.1: Prepare adolescents and their families for transfer to adult-oriented care starting at 11–14 years of age by using checklists to assess readiness and guide preparation, and by conducting part of each visit without the parent/guardian present (Figure 55[b]).

Practice Point 5.3.1.1.2: Provide a comprehensive written transfer summary, and ideally an oral handover, to the receiving healthcare providers including all relevant medical information as well as information about the young person's cognitive abilities and social support (Figure 55[b]).

Practice Point 5.3.1.1.3: Transfer young people to adult care during times of medical and social stability where possible.

THE FINAL STEP

Step 4: Preparing the child and family for RRT

Step 3: Anticipating / preventing / treating complications

Step 2: Slow progression of the disease

Step 1: Treat any reversible conditions

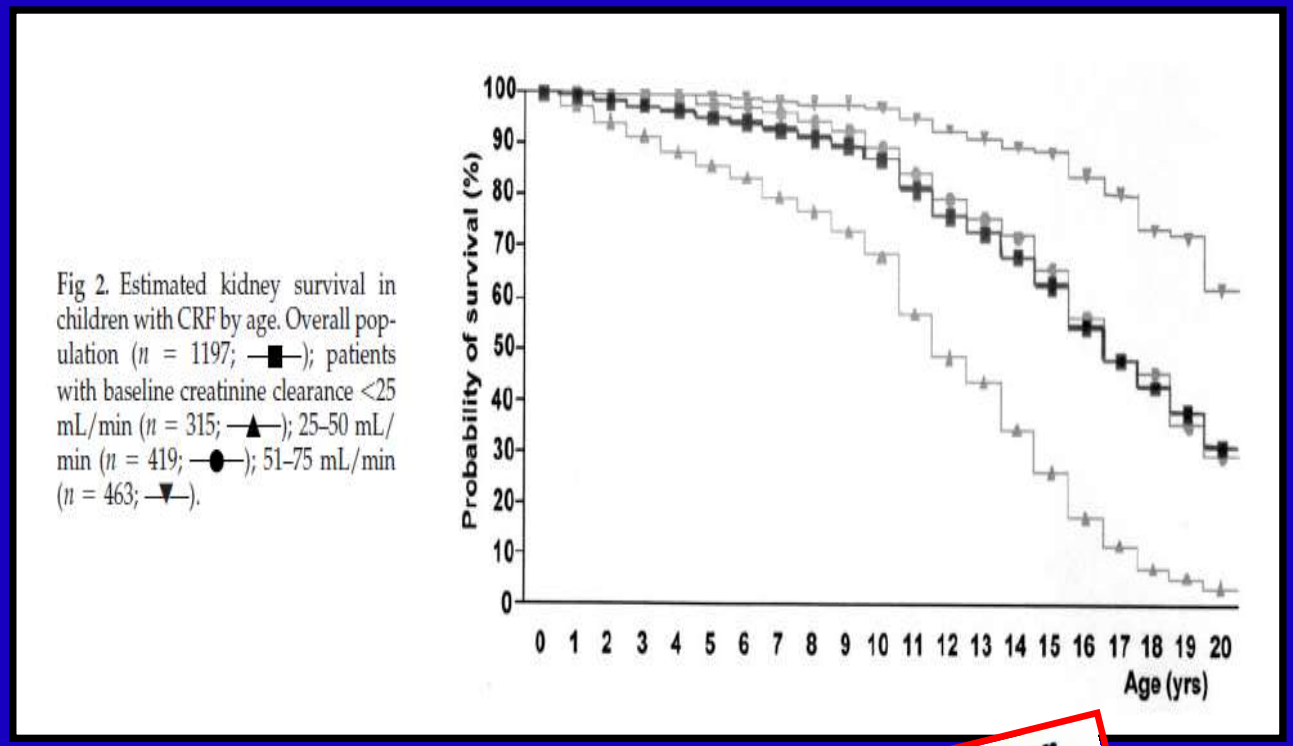


Fig 2. Estimated kidney survival in children with CRF by age. Overall population (n = 1197; —■—); patients with baseline creatinine clearance <25 mL/min (n = 315; —▲—); 25–50 mL/min (n = 419; —●—); 51–75 mL/min (n = 463; —▼—).

Practice Point 5.4.4: In children, in addition to the adult indications for dialysis, **poor growth** refractory to optimized nutrition, growth hormone, and medical management is an indication for initiating KRT.

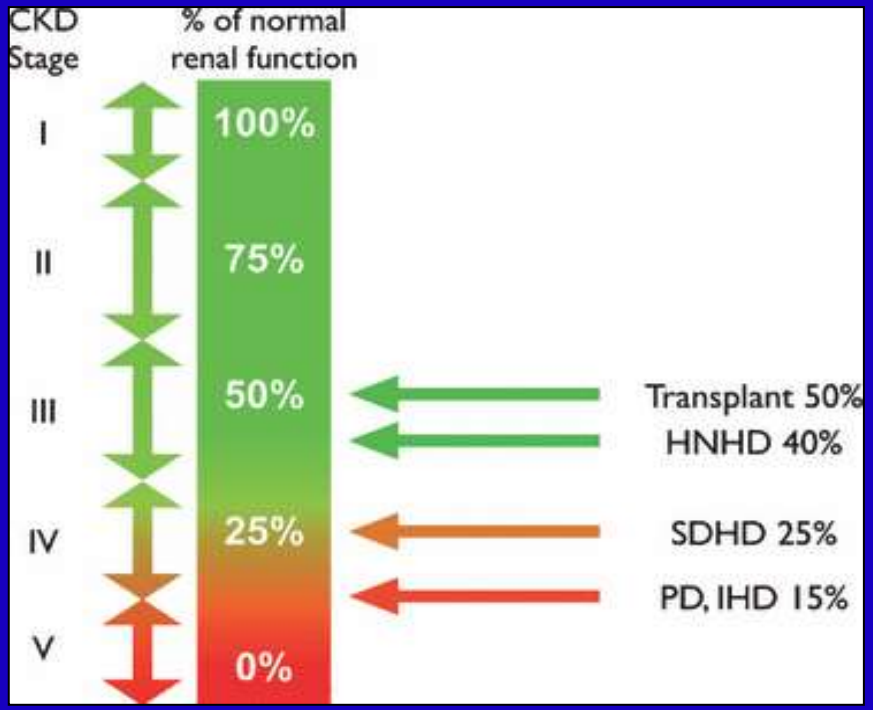
Table 41 | Indications for the initiation of dialysis

Symptoms or signs attributable to kidney f… …ble to uremia, pericarditis, anorexia, medically resistant acid-based or electrolyte a… …or electrolyte abnormalities)

Inability to …

Progressive … …nutritional status refractory to dietary intervention, or cognitive impairment

The final goal ....



Mcfarlane, Seminars in dialysis, 2009

Table 7.16. Survival hazard ratio during childhood for paediatric RRT patients aged <16 years in the UK adjusted for age at start of RRT, gender and RRT modality

	Hazard ratio	Confidence interval	p-value
Age			
0–1.99 years	4.7	2.4–9.3	<0.0001
2–3.99 years	2.4	1.1–5.5	0.03
4–7.99 years	1.6	0.7–3.7	0.23
8–11.99 years	1.3	0.6–3.0	0.48
12–16 years	1.0	–	–
Gender			
Female	1.3	0.9–1.9	0.19
Male	1.0	–	
RRT modality			
Dialysis	6.3	3.4–11.7	<0.0001
Transplant	1.0	–	

The UK Renal Registry

Practice Point 5.4.5: Pursue ***living or deceased donor preemptive kidney transplantation as the treatment of choice*** for children in whom there is evidence of progressive and irreversible CKD. The eGFR at which preemptive transplantation should be undertaken will depend on multiple factors including the age and size of the child and the rate of progression of kidney failure but will usually be between eGFR 5–15 ml/min per 1.73 m^2.

SUMMARY

Top 12

Top 12 Special Considerations in Children and Young Adults from the KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

1 CKD definition and classification

CKD is defined as abnormalities of kidney structure or function, present for >3 months, with implications for health. For newborns with clear kidney disease, do not wait 3 months. The definition includes many different markers of kidney damage, not just decreased GFR and ACR and the cause of CKD should be actively sought (Figure 1). CKD is classified according to **C**ause, **G**FR and **A**CR/PCR to establish severity and guide the type and timing of interventions.

2 Estimating eGFR

Estimate GFR in children using validated equations that have been developed or validated in comparable populations (Figure 1). Where more accurate ascertainment of GFR will impact treatment decisions, GFR should be measured. Use a cystatin C-based eGFR estimating equation in children with low muscle mass (e.g., neuromuscular conditions), as creatinine-based questions may give falsely high eGFR values.

3 Accuracy and reliability

Understand the value and limitations of all methods of estimating and measuring GFR and urinary albumin/protein and implement the requisite laboratory standards of care to ensure accuracy and reliability. Laboratories measuring creatinine in infants or small children must ensure their quality control process include the lowest end of the expected range of values for the group of interest.

4 Definition of low eGFRcr in children

An eGFRcr level <90 ml/min per 1.73 m^2 can be flagged as "low" in children and adolescents over the age of 2 years. This new recommendation acknowledges that children and adolescents should have excellent kidney function. Those with a compromised GFR may deteriorate further, especially during periods of rapid growth.

5 Frequent monitoring during puberty

Children undergoing puberty should be monitored more frequently than the CKD severity-based recommended frequency because puberty constitutes a high-risk period for CKD progression due to the low potential for compromised kidneys to hypertrophy to adapt to the larger body size.

6 When to refer to specialist kidney care services

Refer children and adolescents to specialist kidney care services with sustained ACR of ≥30 mg/g (≥3 mg/mmol) OR a PCR of ≥200 mg/g (≥20 mg/mmol) [when well and with an early morning sample], persistent hematuria, any sustained decrease in eGFR (i.e., greater than expected from variability), hypertension, kidney outflow obstruction or anomalies of the kidney and urinary tract, known or suspected CKD, recurrent urinary tract infection.

SUMMARY

Top 12

Top 12 Special Considerations in Children and Young Adults from the KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

7 Genetic cause is more likely than in adults

Children and young people with kidney failure are more likely to have a genetic cause of their disease than adults. In some healthcare settings, genetic testing may be pursued first, obviating the need for kidney biopsy and the associated risks, which may be different in children than adults (Figure 2).

8 Maintain mean arterial blood pressure <50th centile

Use renin-angiotensin system inhibitors (plus other agents as needed) to maintain a mean arterial blood pressure <50th centile on 24 hour ambulatory blood pressure monitoring or systolic BP measured manually at the 50th–75th centile for age, sex and height to slow progression of kidney disease.

9 Do not restrict protein intake

Do not restrict protein intake in children with CKD due to the risk of growth impairment. The target protein and energy intake in children with CKD G2–G5 should be at the upper end of the normal range for healthy children to promote optimal growth. Follow age-based Reference Nutrient Intake (RNI) when counselling about sodium intake.

10 Treat with a comprehensive treatment strategy

Treat children and young adults with CKD with a comprehensive treatment strategy to reduce risks of progression of CKD and its associated complications encompassing education, lifestyle, diet, undertake physical activity aiming for ≥60 minutes daily, smoking cessation, and medications, where indicated (Figure 3).

11 Drug stewardship

Parents and carers should be central to drug stewardship for children with CKD, with increasing involvement from the young person as they move towards transition. Considerations specific to the use of gadolinium preparations in young children and neonates must also be contemplated in addition to the general caution against their use in situations of GFR <30 ml/min per 1.73 m^2.

12 CKD care across the lifespan

Special considerations should be given for CKD care across the lifespan (Figure 4), keeping the child and young person's developmental and psychological needs in mind. Transition clinics may improve the outcomes of young people transitioning from pediatric to adult care (Figure 5). These may be staffed exclusively by pediatric care providers and focus on preparation or may be jointly staffed by pediatric and adult providers. Young people should have the opportunity to visit the adult clinic prior to transfer.

CONCLUSION

THANK YOU!!

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