

Nursing care for adults with complex health problems in the acute and chronic stages of the urinary system



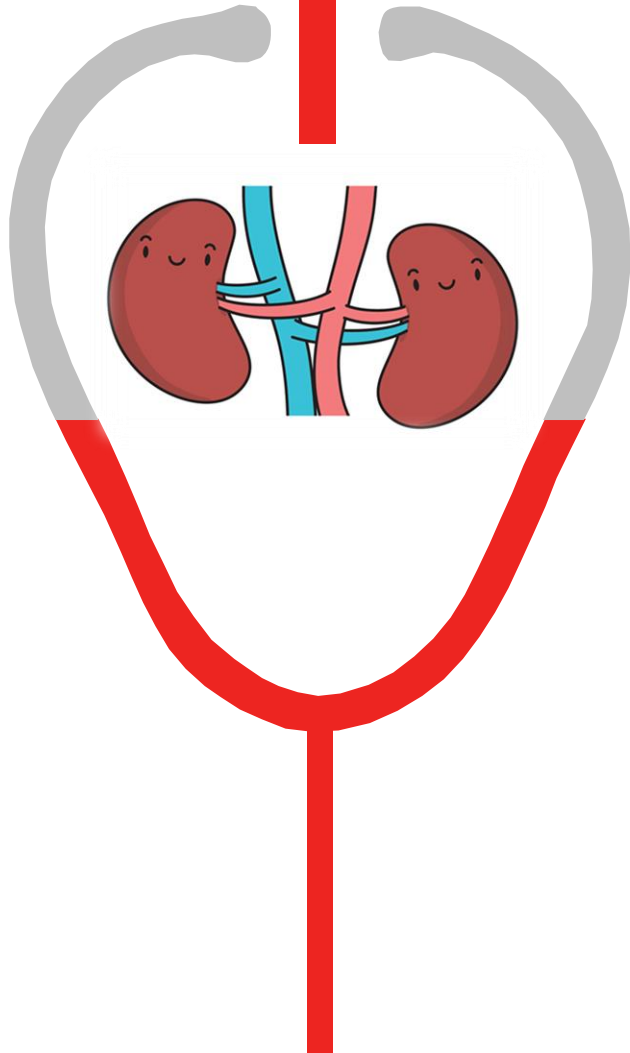
Dr. Orathai Rungvachira



How To
ดูแลไต




Objective



- 01** Identify the definition and causes of acute kidney injury and chronic kidney disease.
- 02** Identify the symptoms, signs, and treatment for patients with kidney problems.
- 03** Define the assessing abnormalities in patients with acute kidney injury and chronic kidney disease.
- 04** Discuss the nursing process for patients with acute kidney injury and chronic kidney disease.

Acute Kidney Injury : AKI

- 
- in 1951 used “acute renal failure (ARF)”
 - in 2004 Acute Dialysis Quality Initiative (ADQI) and Nephrology and critical care societies establish Acute Kidney Injury Network (AKIN) has adjusted to Acute Kidney Injury and define criteria for the diagnosis of acute kidney injury. This criterion is called RIFLE criteria & AKIN . This criteria based on two criteria:
 - Serum Cr (SCr)
 - Urine output

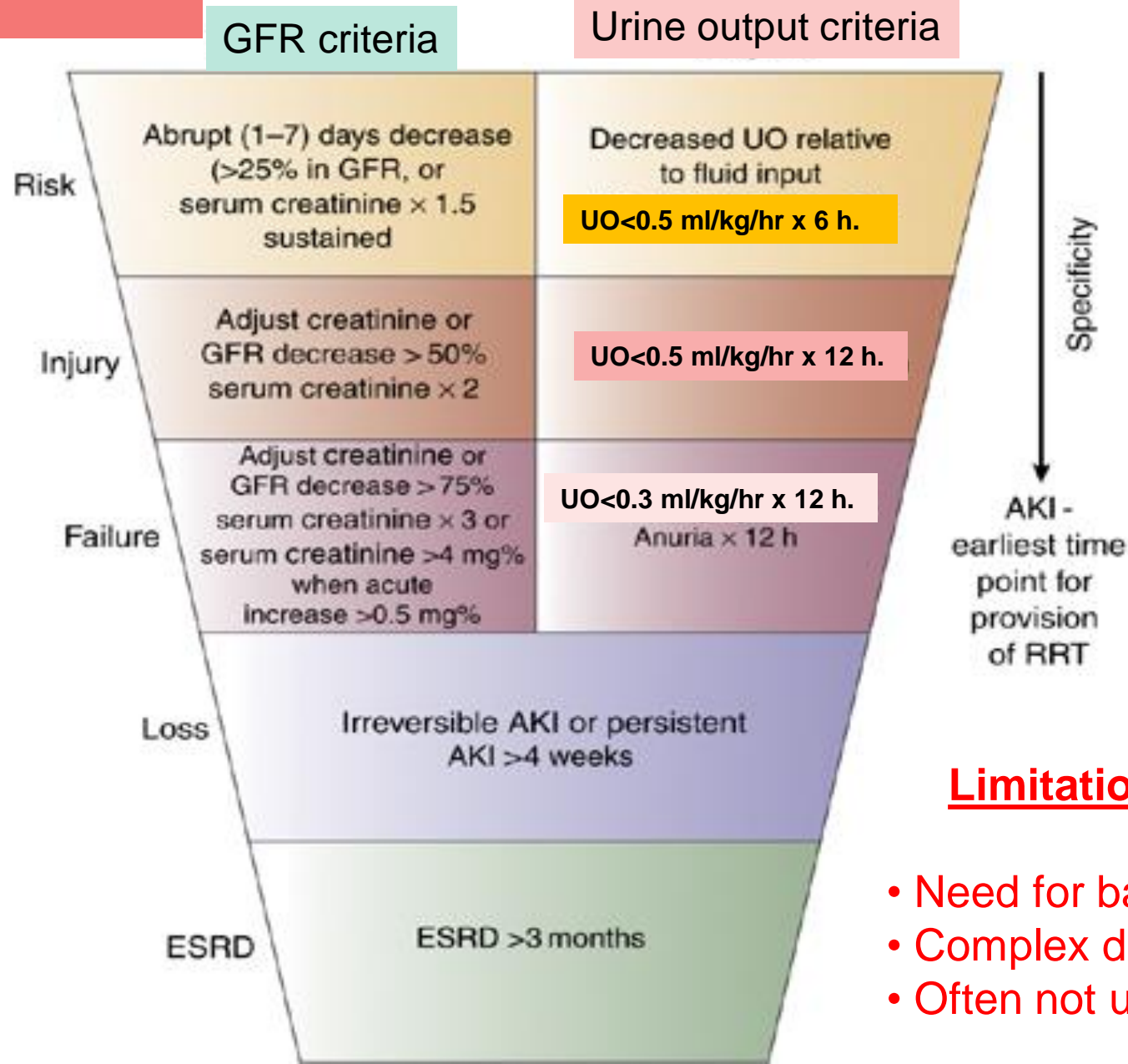
AKI is defined as any of the following :

Increase in SCr by ≥ 0.3 mg/dl (≥ 26.5 μ mol/l) within 48 hours; or

Increase in SCr to ≥ 1.5 times baseline, which is known or presumed to have occurred within the prior 7 days; or Urine volume < 0.5 ml/kg/h for 6 hours.

(normal BUN 5 - 25 mg% Creatinine 0.6 - 1.50 mg%)

RIFLE classification



Limitations of RIFLE Criteria

- Need for baseline SCr
- Complex determination of UOP
- Often not used in clinical situations

AKIN classification

Considered from 2 Cr values not more than 48 hours apart.

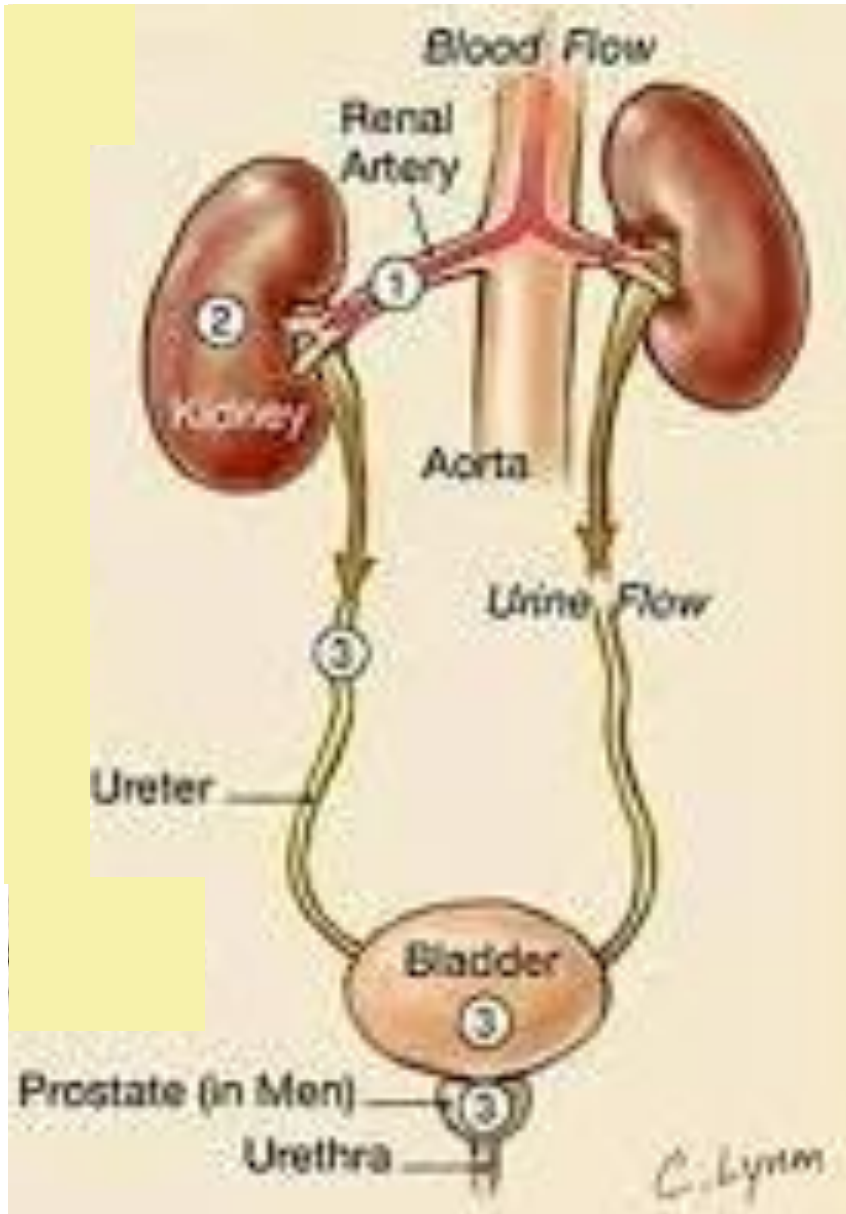
AKIN stage	Serum Creatinine Criteria	Urinary Output Criteria	Time
1	↑ Cr ≥ 0.3 mg/dL or ↑ ≥ 150 -200% from baseline	< 0.5 mL/kg/hr	> 6 hrs
2	↑ Cr to > 200-300% from baseline	< 0.5 mL/kg/hr	> 12 hrs
3	↑ Cr to > 300% from baseline or Cr ≥ 4 mg/dL with an acute rise of at least 0.5 mg/dL	< 0.3 mL/kg/hr or anuria	X 24 hrs X 12 hrs

Acute Kidney Injury (AKI)

Comparison of RIFLE and AKIN criteria for diagnosis and classification of AKI

AKI staging	Urine output	RIFLE	
Serum creatinine	(common to both)	Class	Serum creatinine or GFR
Stage 1 Increase of more than or equal to 0.3 mg/dl ($\geq 26.5 \mu\text{mol/l}$) or increase to more than or equal to 150% to 200% (1.5- to 2-fold) from baseline	Less than 0.5 ml/kg/h for more than 6 hours	Risk	Increase in serum creatinine $\times 1.5$ or GFR decrease $>25\%$
Stage 2 Increased to more than 200% to 300% (>2 - to 3-fold) from baseline	Less than 0.5 ml/kg per hour for more than 12 hours	Injury	Serum creatinine $\times 2$ or GFR decreased $>50\%$
Stage 3 Increased to more than 300% (>3 -fold) from baseline, or more than or equal to 4.0 mg/dl ($\geq 354 \mu\text{mol/l}$) with an acute increase of at least 0.5 mg/dl ($44 \mu\text{mol/l}$) or on RRT	Less than 0.3 ml/kg/h for 24 hours or anuria for 12 hours	Failure	Serum creatinine $\times 3$, or serum creatinine $>4 \text{ mg/dl}$ ($>354 \mu\text{mol/l}$) with an acute rise $>0.5 \text{ mg/dl}$ ($>44 \mu\text{mol/l}$) or GFR decreased $>75\%$
		Loss	Persistent acute renal failure=complete loss of kidney function >4 weeks
		End-stage kidney disease	ESRD >3 months

Cause of Acute Kidney Injury

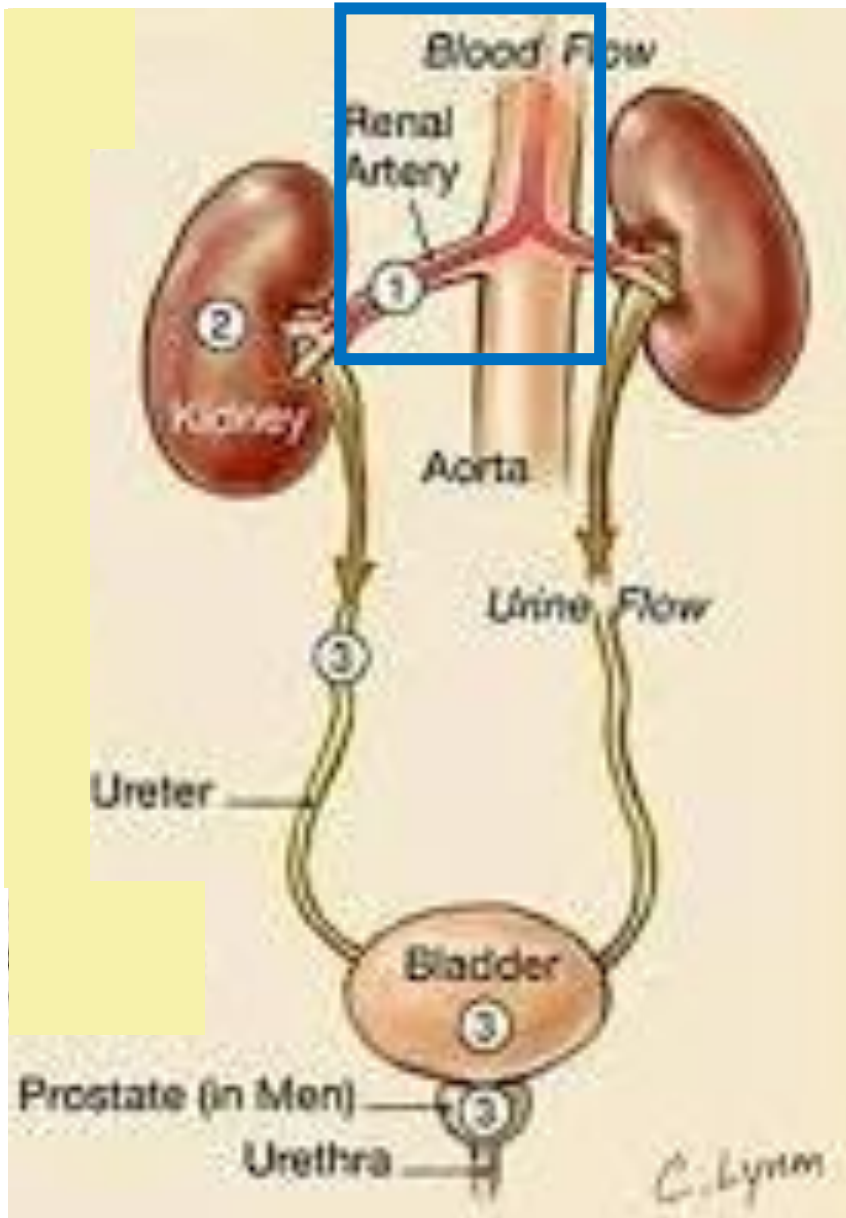


1. **Pre renal AKI: Hypoperfusion** in which the integrity of renal parenchyma is preserved

2. **Intrinsic AKI: Involving renal parenchymal tissue**

3. **Post renal AKI : Obstructive AKI. Acute obstruction of urinary flow**

Cause of Acute Kidney Injury



1. Pre renal AKI

☐ Decrease effective extracellular fluid volume

: burns, diarrhea, vomiting, diuretics, malnutrition, GI loss, hemorrhage

☐ Decrease cardiac output

: myocardial dysfunction, myocardial infarction, arrhythmias, ischemic heart disease, cardiomyopathies, hypertensive disease, cardiac tamponade

☐ Peripheral vasodilation

: drugs-antihypertensive agents, sepsis

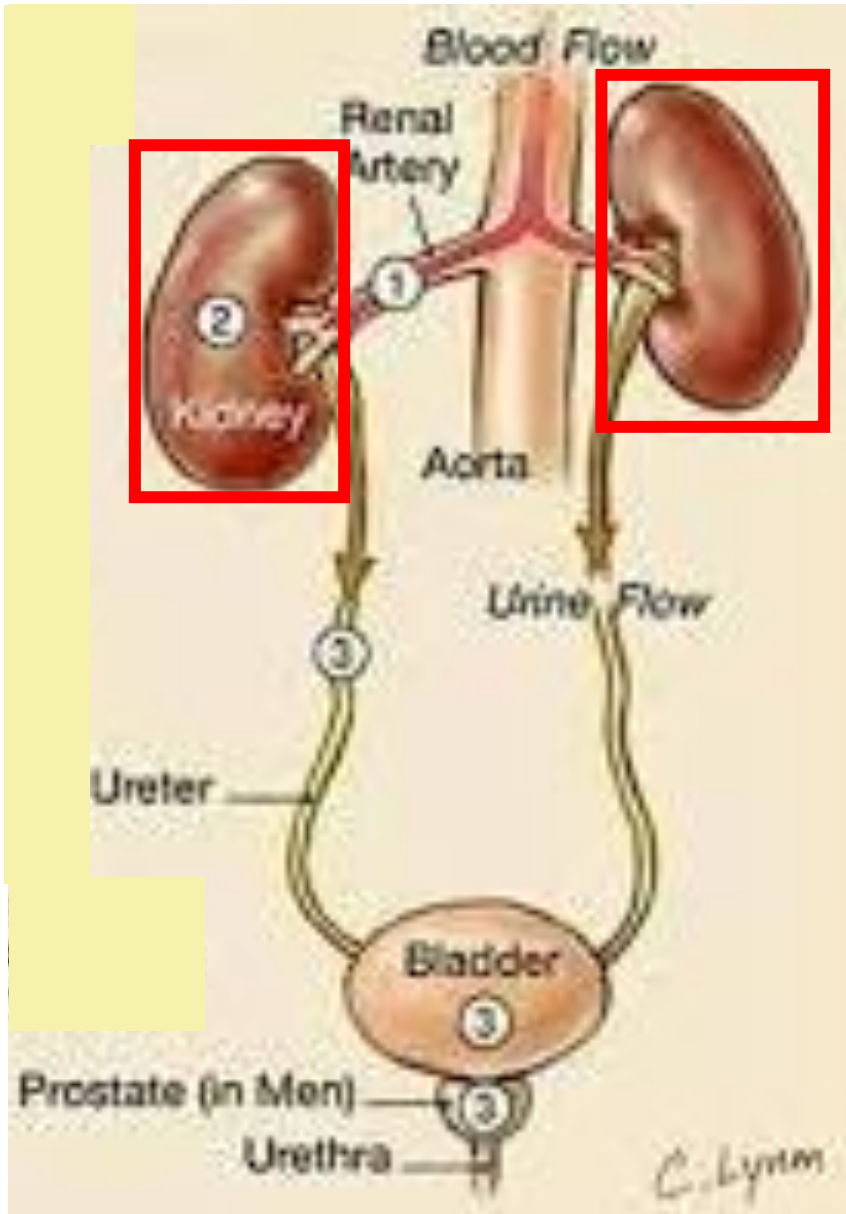
☐ Severe renal vasoconstriction

: sepsis, hepato renal syndrome

☐ Mechanical occlusion of renal arteries

: Thrombotic occlusion, emboli, trauma

Cause of Acute Kidney Injury



2. Intrinsic AKI

☐ Renal vascular disorder

: vasculitis, malignant hypertension, scleroderma, disseminated intravascular coagulation, mechanical renal artery occlusion, renal vein thrombosis

☐ Glomerulonephritis

: post infectious, rapid progressive glomerulonephritis, lupus nephritis

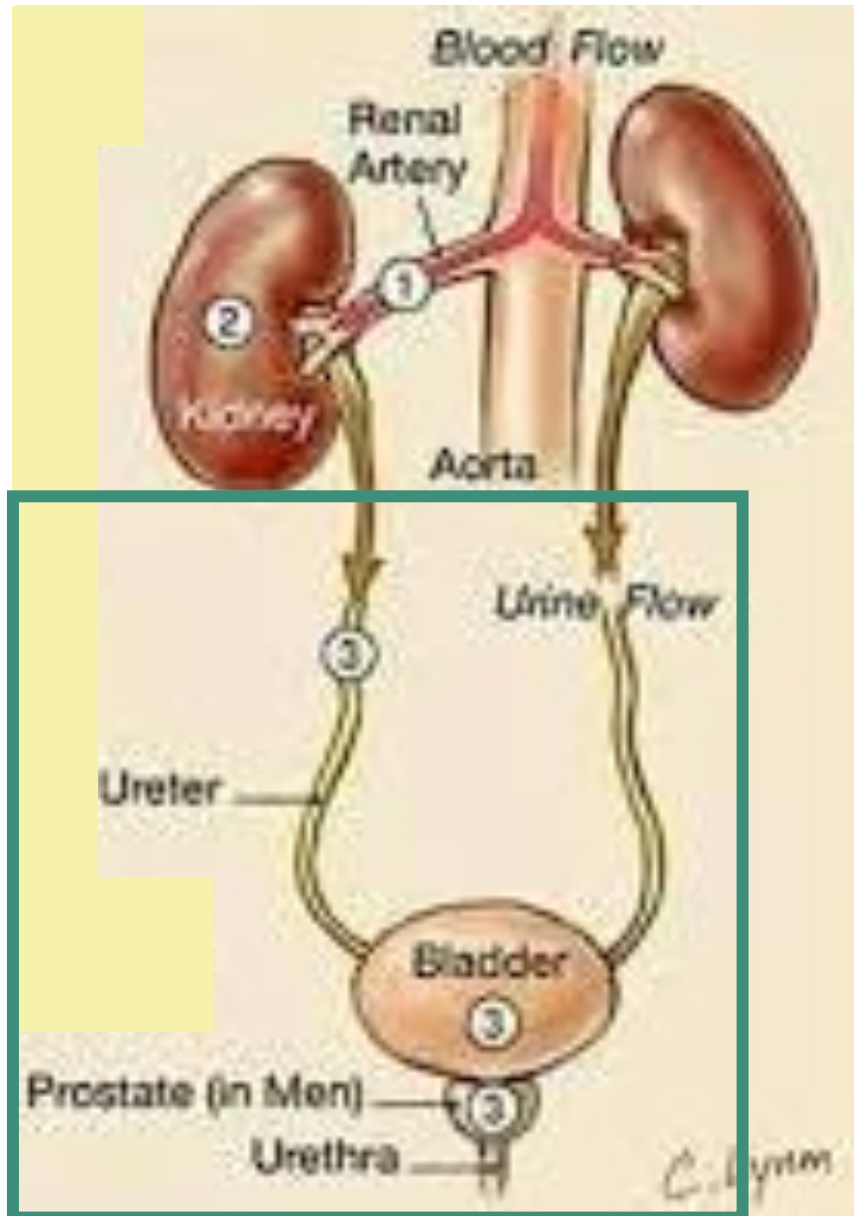
☐ Interstitial nephritis

: Drugs (penicillins, sulfonamides, rifampin, captopril, allopurinol, NSAID), Infections (leptospirosis), Connective tissue disease

☐ Tubular necrosis

: Renal ischemia (prolong prerenal), Nephrotoxins (aminoglycosides, radiocontrast agents, heavy metals, organic solvents)

Cause of Acute Kidney Injury

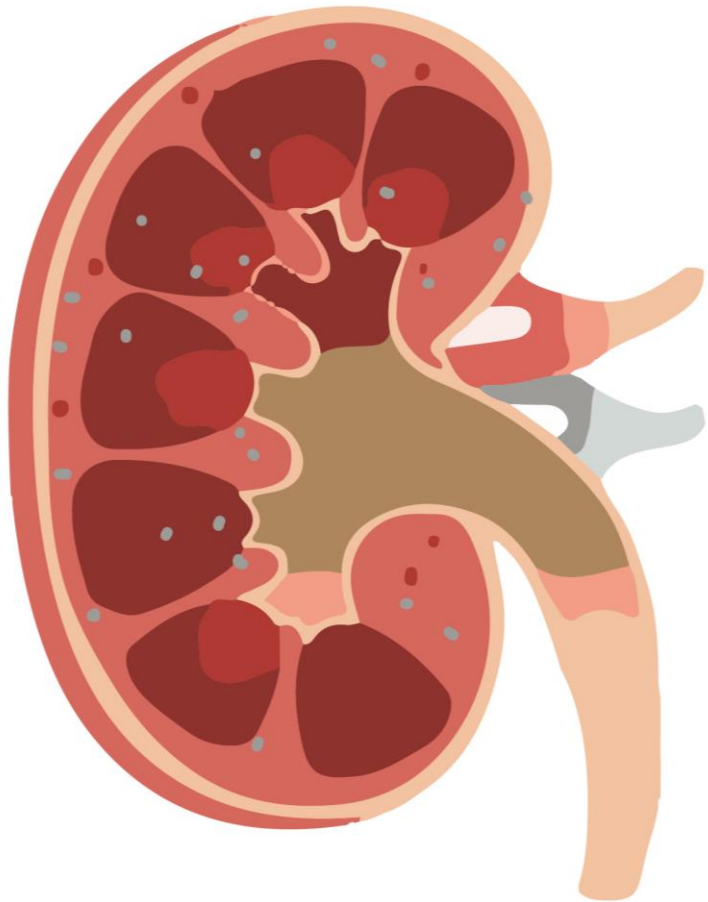


3. Post renal AKI

: calculi, tumor, benign prostatic hypertrophy, urethral strictures, blood clot

Phases of acute kidney injury

Acute Kidney Injury



1. Initiation phase : Urine output > 400 ml/24hr

2. Oliguria phase : is a well-recognized and poor prognostic indicator in patients with AKI.

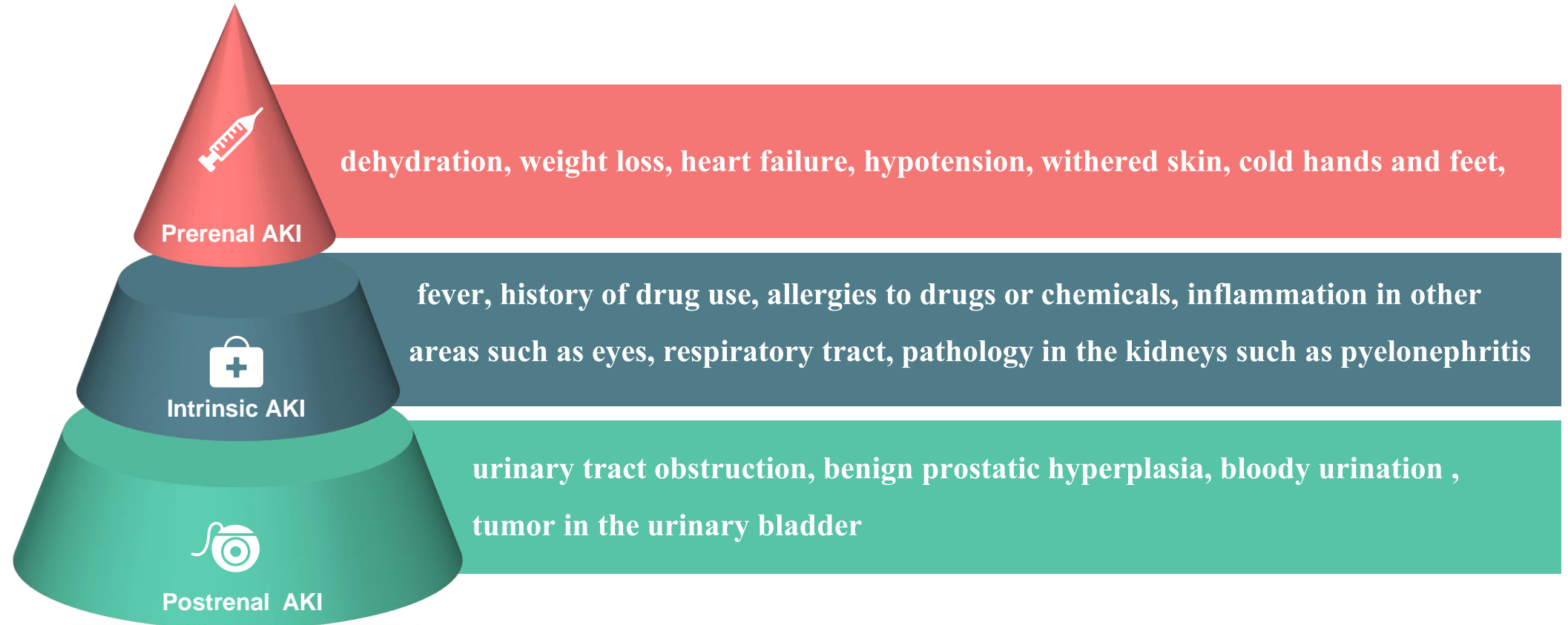
- Urine output < 400 ml/24 hr, Fluid volume excess, Metabolic acidosis, Sodium balance, Potassium excretion, Waste product accumulation

3. Diuretic phase: Gradual increase of urine output as a result of osmotic diuresis

4. Recovery phase

Assessment

1. History taking



Assessment

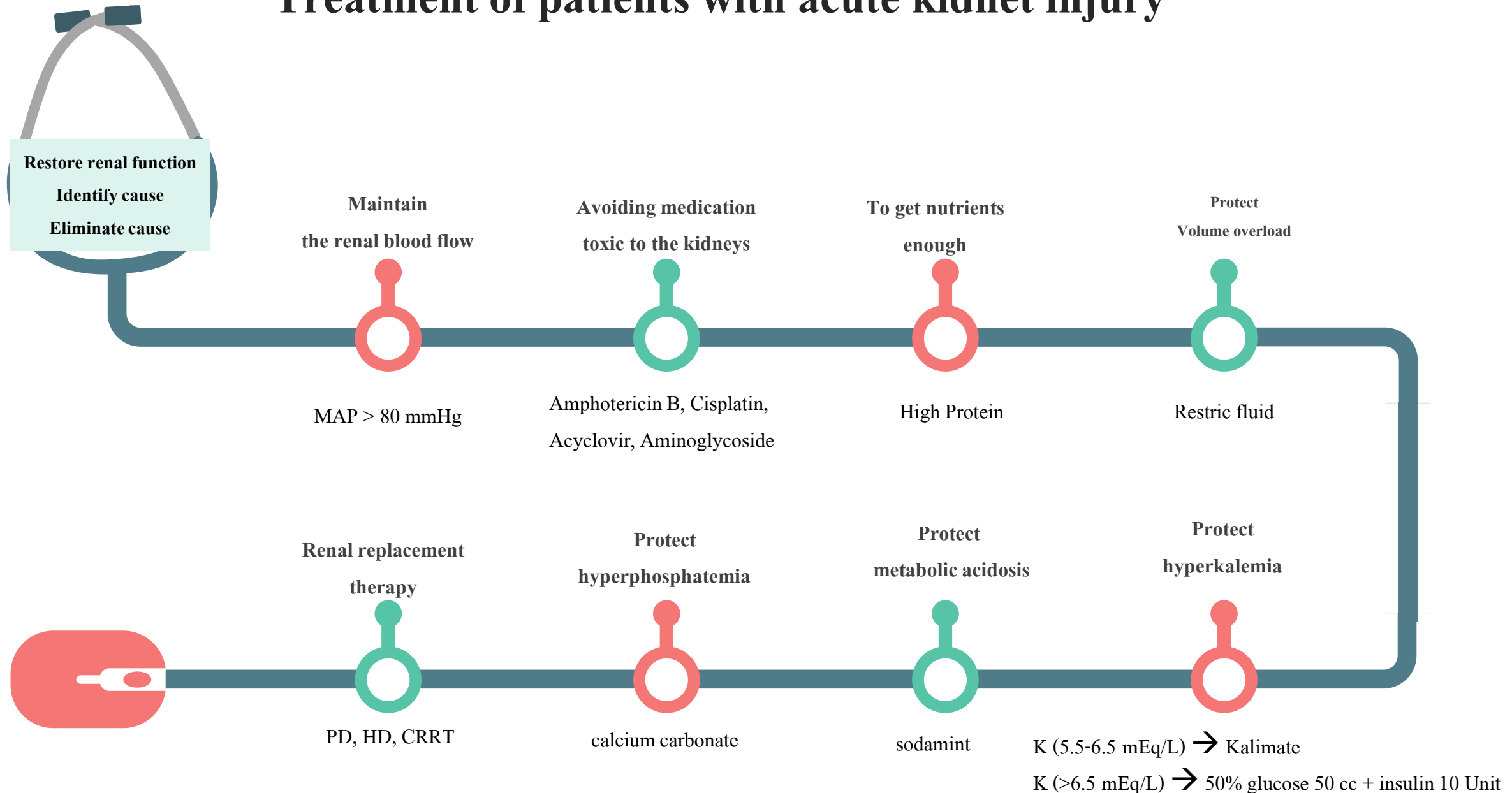
2. Physical examination : Assessment of overhydration in the body, difficulty in breathing, crepitation sounds may be found. high blood pressure. Assessment of uremia, including nausea and vomiting. Assessing nervous system symptoms, level of consciousness

3. Laboratory examination : Urine analysis results include wbc or RBC, protein. Blood test results include BUN, Cr increased, phosphate and potassium increased, calcium bicarbonate decreased, Hct decreased

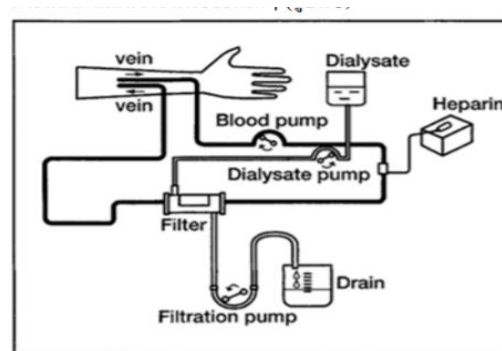
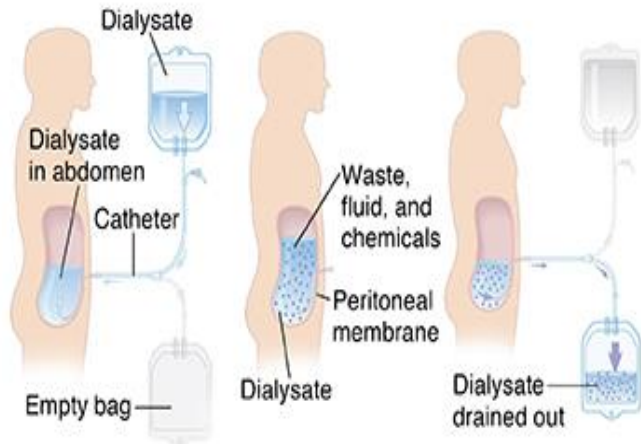
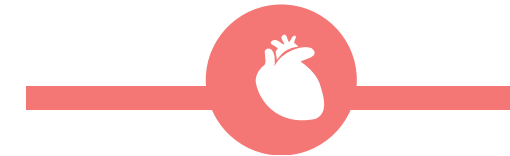
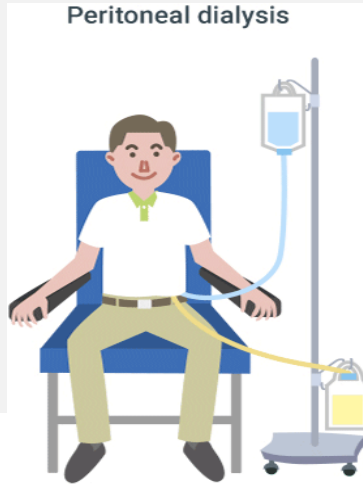
4. Investigation test: To see abnormalities in the size of the kidneys and ureters. to see obstruction in the urinary tract. Kidney biopsy for pathological examination



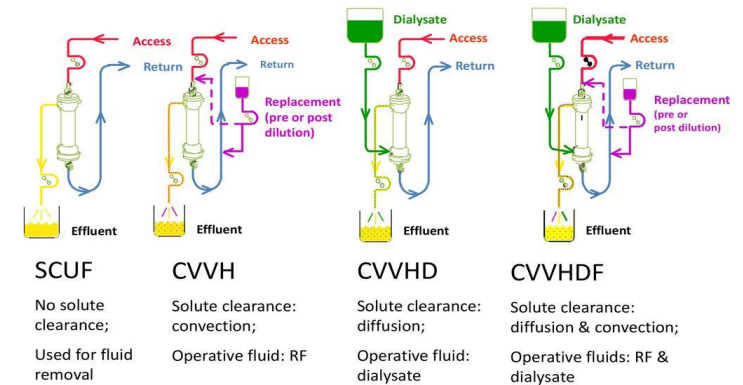
Treatment of patients with acute kidney injury



การดูแลรักษาผู้ป่วยไตวายเฉียบพลัน

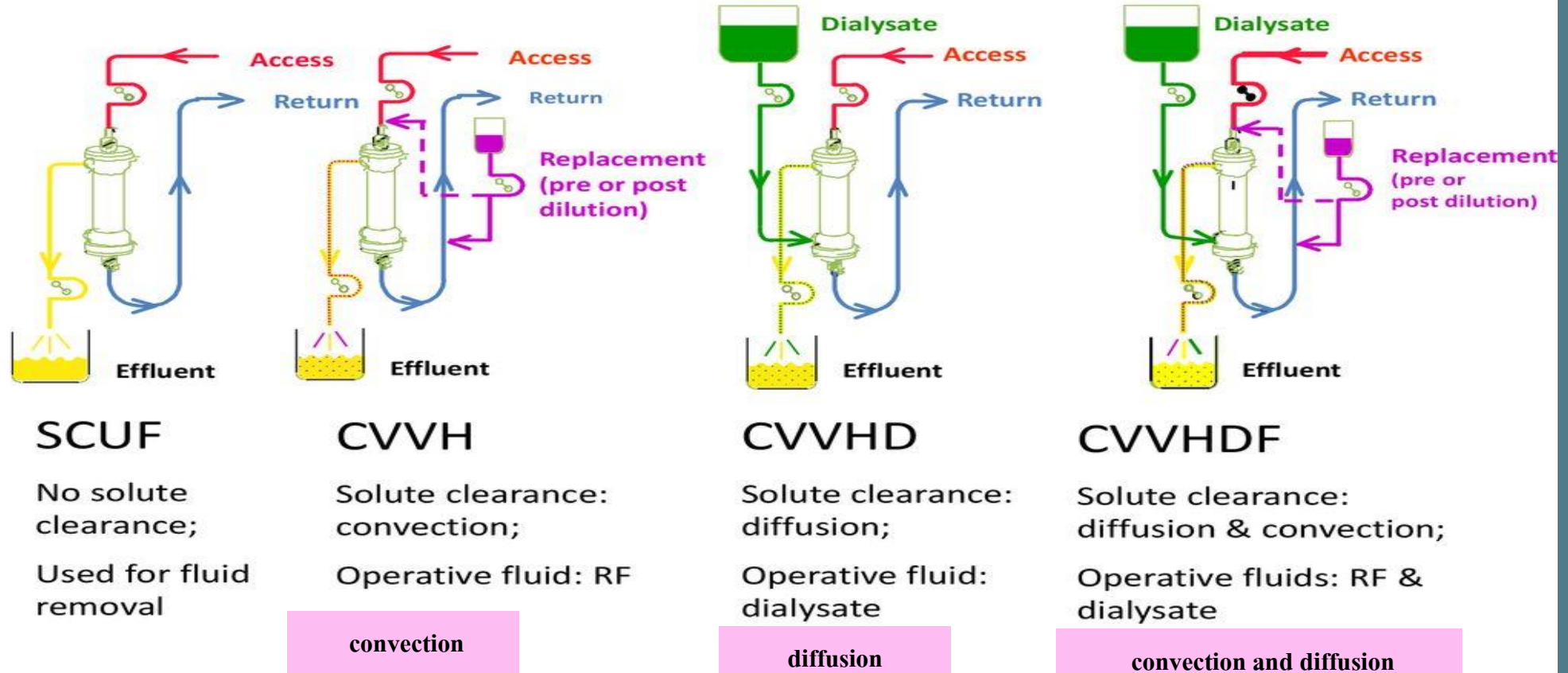


CRRT Modalities





CRRT Modalities



Chronic Kidney disease : CKD

Kidney function

Glomerular filtration rate (GFR) < 60 mL/min/1.73 m² for ≥ 3 months with or without kidney damage

AND/OR

Kidney damage

≥ 3 months, with or without decreased GFR, manifested by either

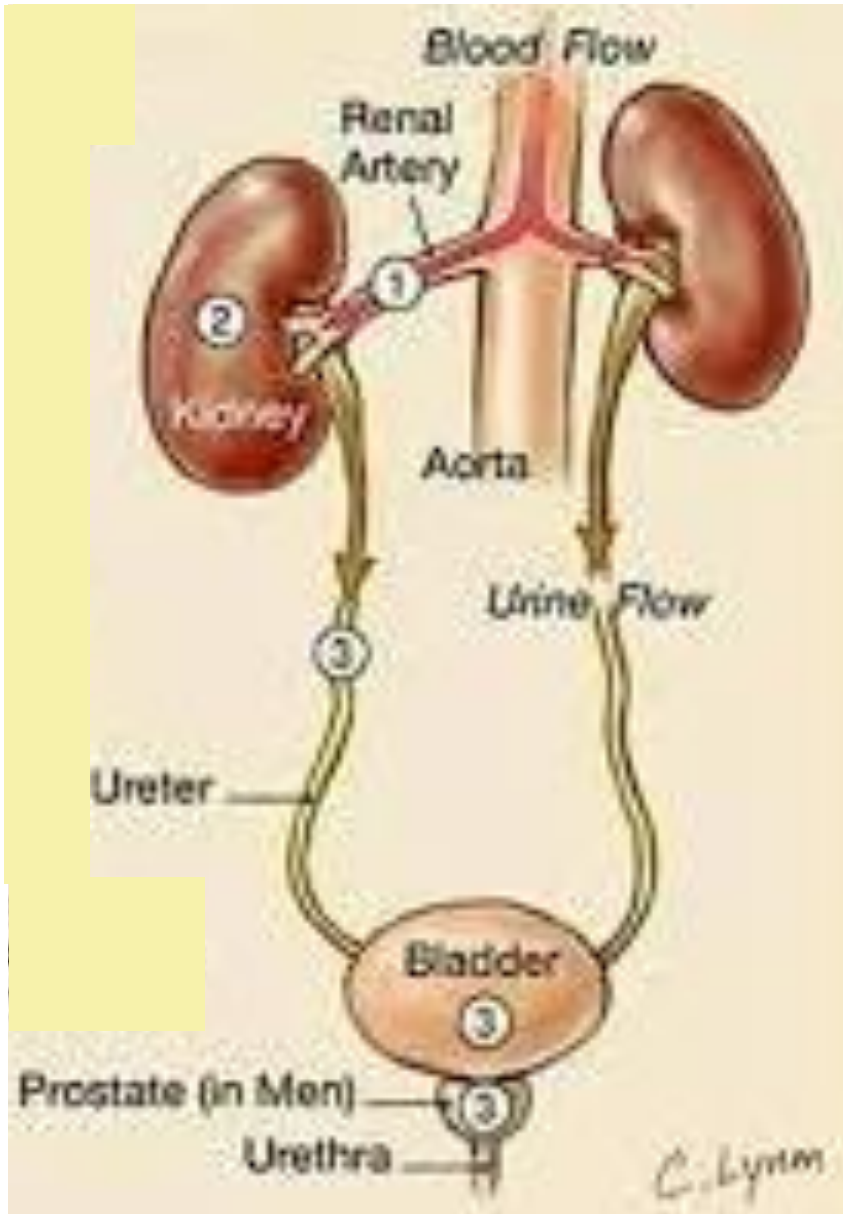
- Pathological abnormalities
- Markers of kidney damage, i.e., albuminuria
 - Urine albumin-to-creatinine ratio (UACR) > 30 mg/g



Stage of chronic kidney disease

Stage of CKD	eGFR result	What it means
Stage 1	90 or higher	<ul style="list-style-type: none">- Mild kidney damage- Kidneys work as well as normal
Stage 2	60-89	<ul style="list-style-type: none">- Mild kidney damage- Kidneys still work well
Stage 3a	45-59	<ul style="list-style-type: none">- Mild to moderate kidney damage- Kidneys don't work as well as they should
Stage 3b	30-44	<ul style="list-style-type: none">- Moderate to severe damage- Kidneys don't work as well as they should
Stage 4	15-29	<ul style="list-style-type: none">- Severe kidney damage- Kidneys are close to not working at all
Stage 5	less than 15	<ul style="list-style-type: none">- Most severe kidney damage- Kidneys are very close to not working or have stopped working (failed)

Cause of chronic kidney disease

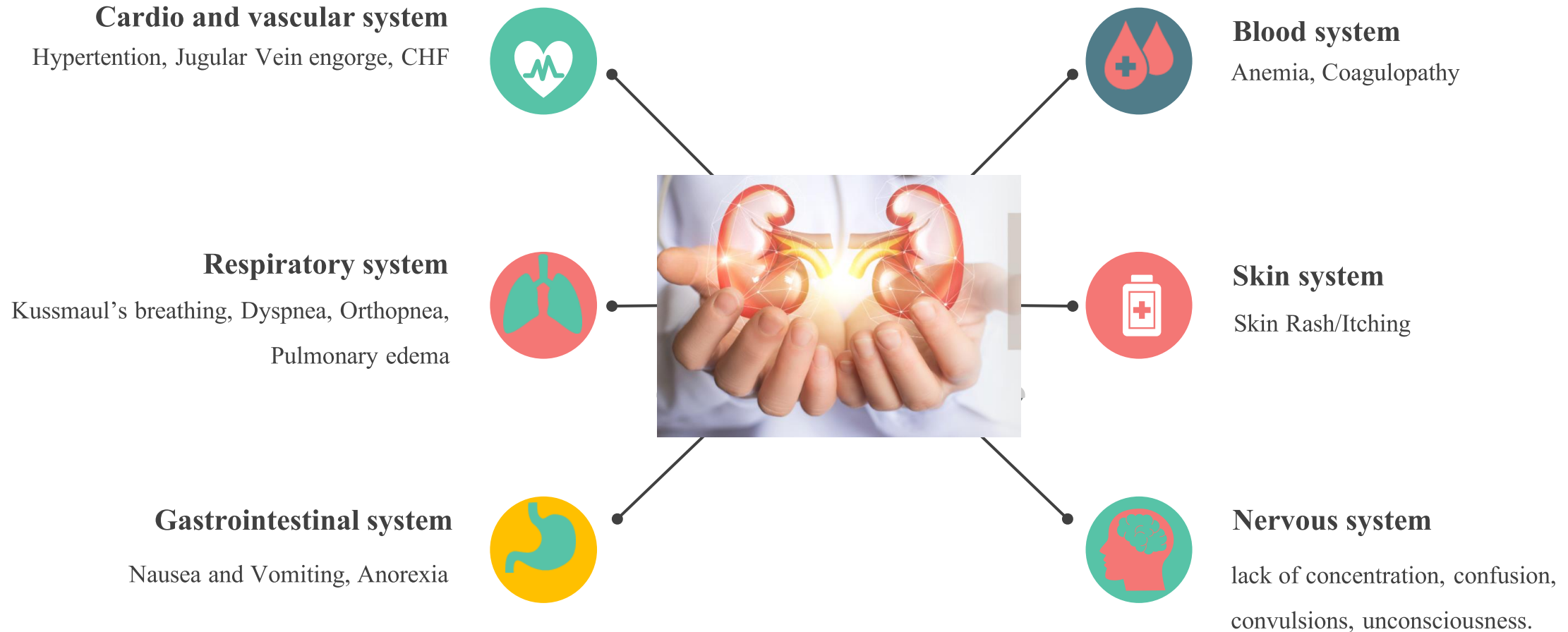


1. Pre renal : That affects blood circulatory system result to decrease renal blood flow such as diabetes, high blood pressure, diseases of the cardiovascular system

2. Intrinsic : That affects the destruction of the kidneys, ureters, blood vessels in the kidneys. Causing kidney function to deteriorate such as chronic pyelonephritis, chronic glomerulonephritis, renal artery stenosis, renal edema, kidney cancer

3. Post renal : As a result, the kidneys are unable to excrete urine normally for more than 3 months, including urinary tract obstruction. bladder cancer enlarged prostate

Effects of renal failure and pathological changes



Effects of renal failure and pathological changes

Decrease immune response
Decrease wbc, Decrease lymphocyte



Musculoskeletal system
Osteoporosis, Osteosclerosis

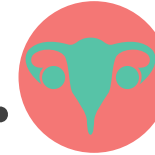


Electrolyte imbalance
Metabolic acidosis, Hyperkalemia,
Hyperphosphatemia



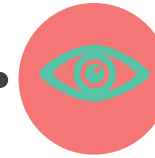
Reproductive system

Decreased sex hormones, Decreased sex drive



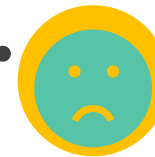
Eyes

red eyes, blurred vision

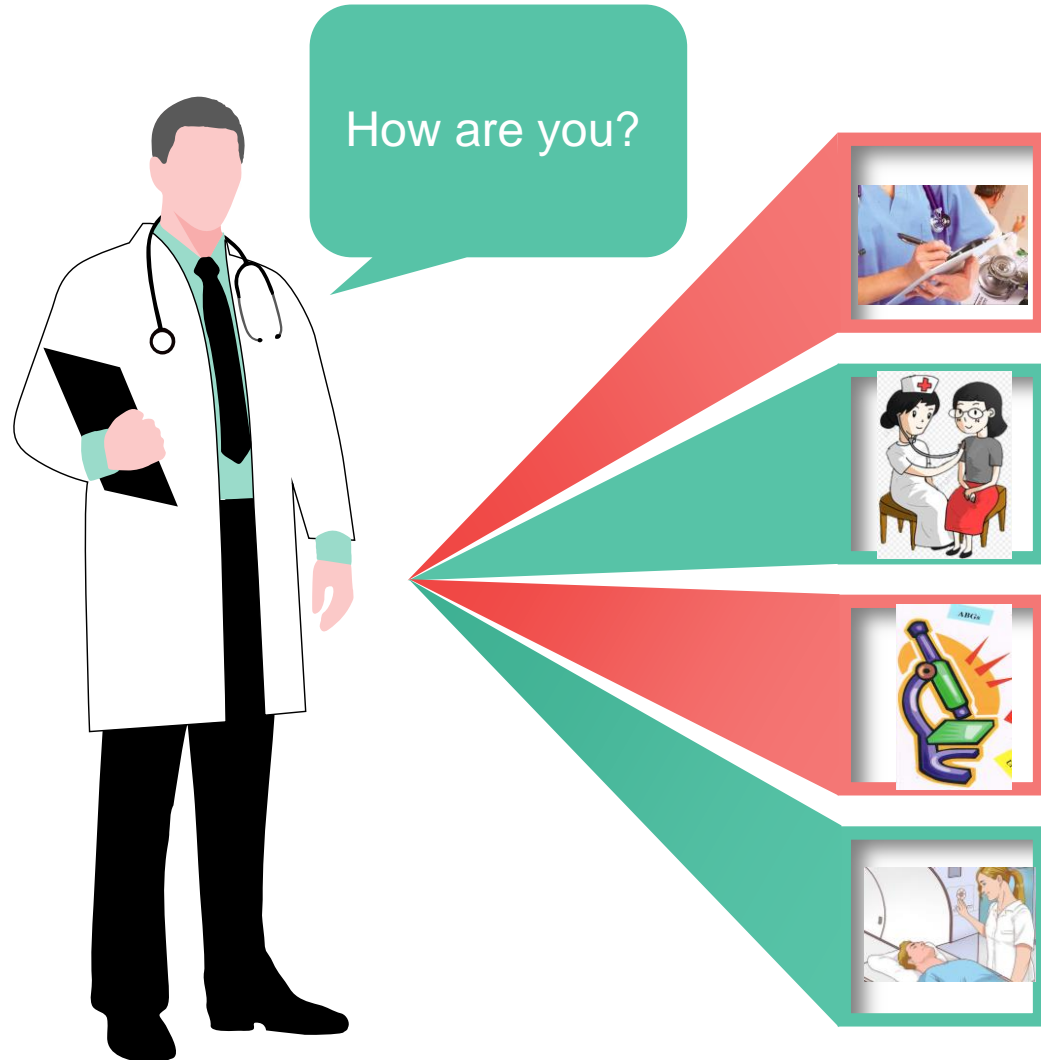


Mental and emotional state

Anxiety, depression, stress



Assessment



History taking

Taking a history of uremia such as nausea, vomiting, tiredness, orthopnea

Physical examination

cough, difficulty breathing, changes in level of consciousness, swelling

Laboratory examination

Increase BUN Cr , Decrease GFR , High potassium and phosphate,
Decrease Hct

Investigation test

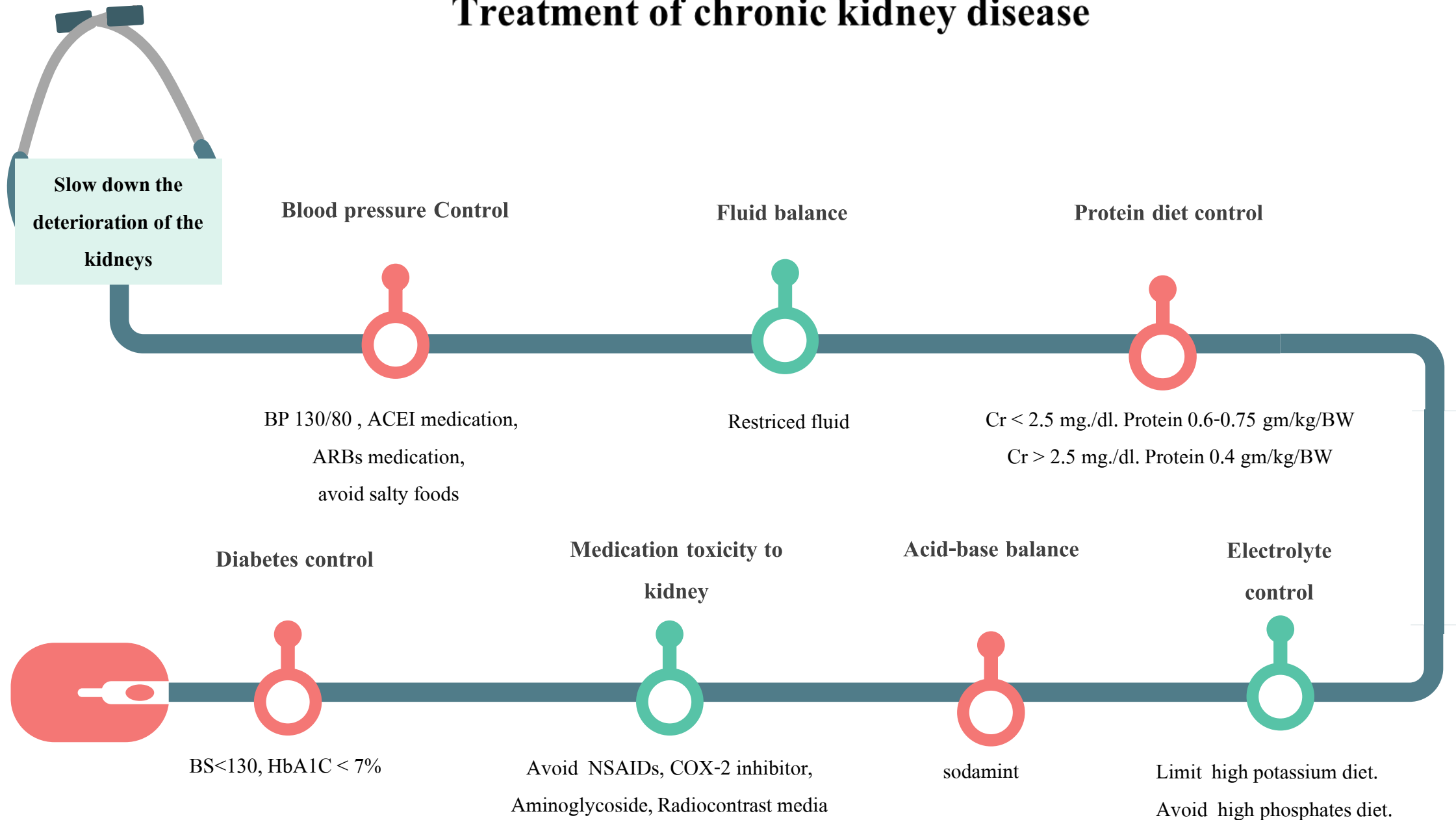
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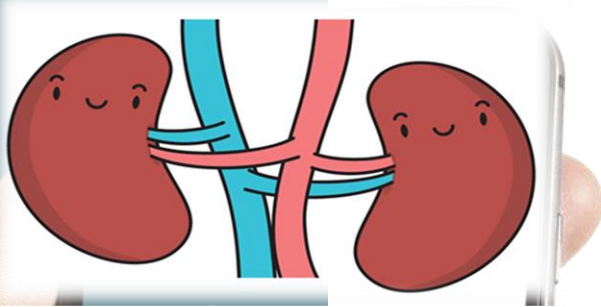
Treatment of chronic kidney disease

- ❖ **Slow down the deterioration of the kidneys.**
- ❖ **Renal replace therapy**



Treatment of chronic kidney disease



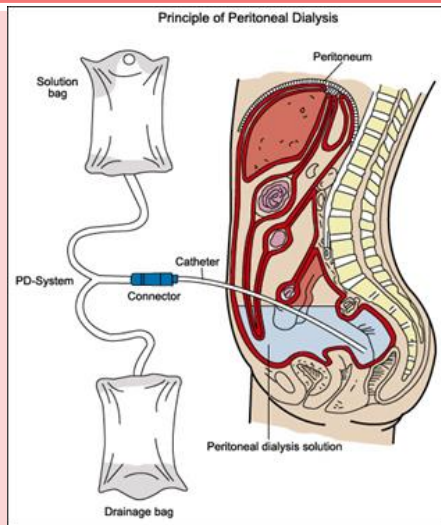


Treatment of chronic kidney disease

Stage	GFR (mL/min/1.73 m2)	Frequency for follow	Treatment
1	>90	every 6-12 months	Diagnose quickly, Slow down the deterioration of the kidneys. Reduce risk factors for CVD
2	60-89	every 6-12 months	Slow down the deterioration of the kidneys.
3	30-59	every 3-6 months	Treat complications
4	15-59	every 2-3 months	Advice RRT
5	< 15 or End stage renal failure	every 1-3 months	RRT

Treatment of chronic kidney disease

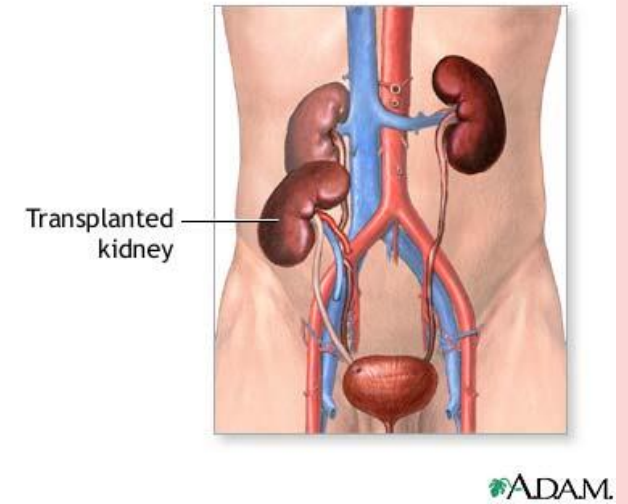
Continuous peritoneal dialysis CAPD



Hemodialysis HD

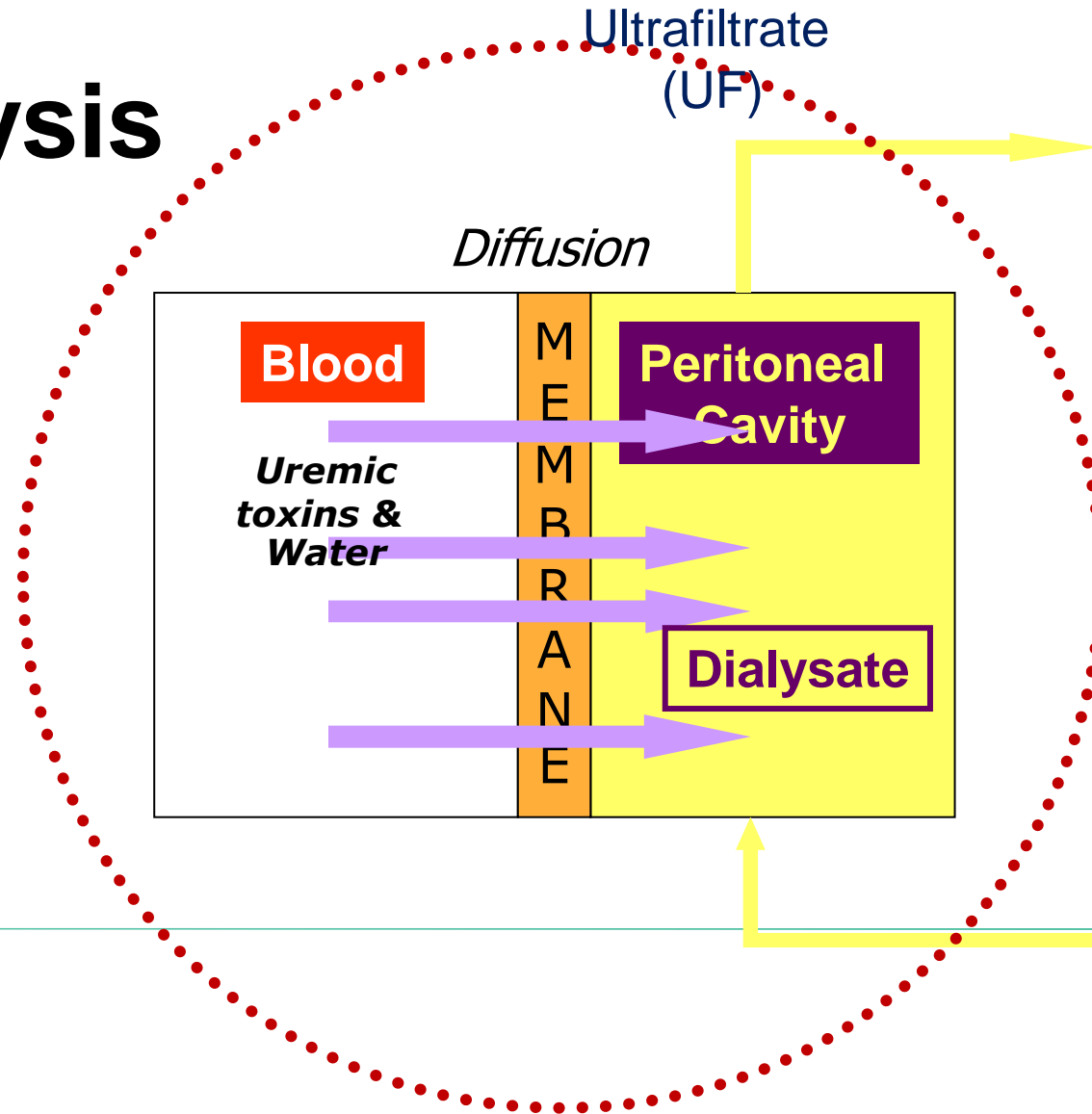
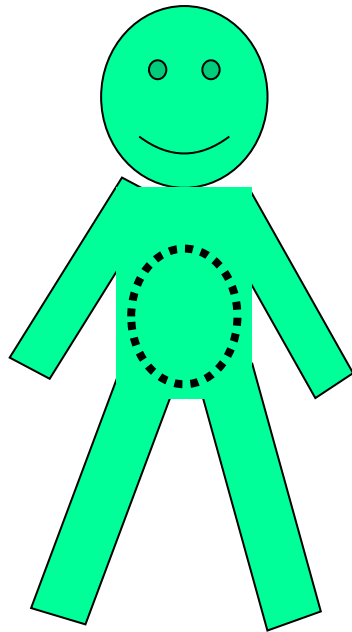


Kidney Transplant KT



“ Renal replacement therapy: RRT is therapy that replaces the normal blood-filtering function of the kidneys. It is used when the kidneys are not working well, which is called kidney failure and includes acute kidney injury and chronic kidney disease. ”

Continuous peritoneal dialysis



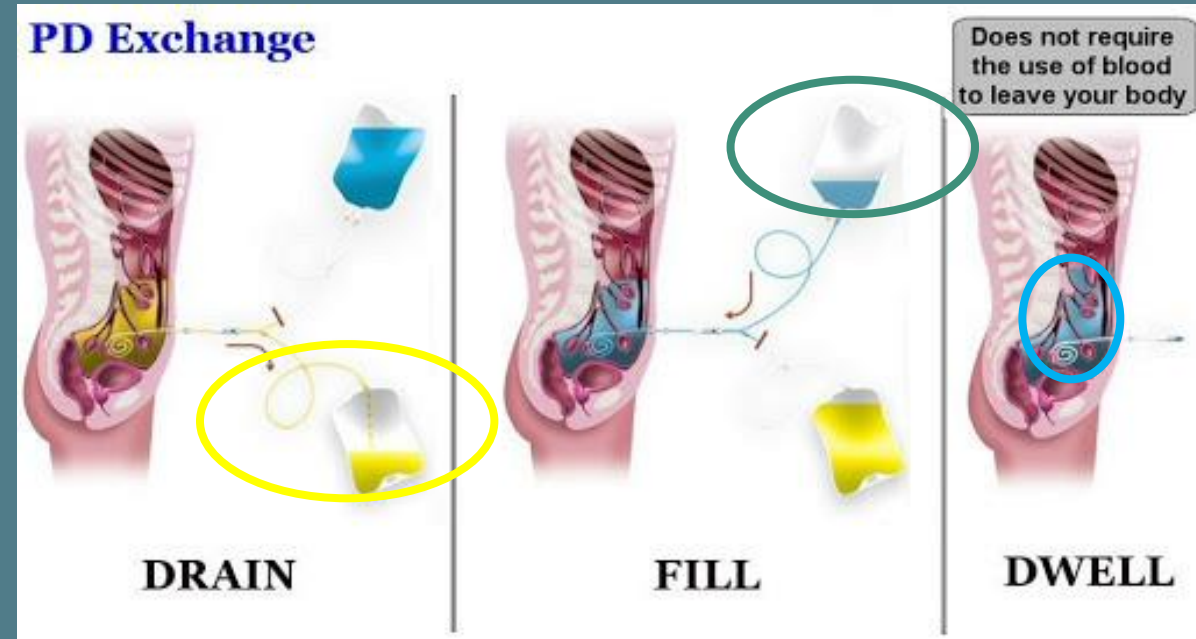
Continuous peritoneal dialysis : CAPD

Indication	Contraindications
<ul style="list-style-type: none">➤ Vascular access failure➤ Intolerance to hemodialysis➤ Prosthetic valvular disease➤ Children aged 0-5 years➤ Patient preference➤ Poor cardiac function➤ Peripheral vascular disease	<ul style="list-style-type: none">➤ Uncorrected abdominal wall hernia➤ Pleuroperitoneal shunt➤ Abdominal adhesions

PD Prescription

- Mode: CAPD
- Peritoneal Dialysate Fluid
 - 1.5%, 2.5%, 4.25% Dextrose
 - 2 Lite / bag
 - 4 - 6 cycles / day
- Adequacy
 - Weekly $Kt/V > 1.7$

Step



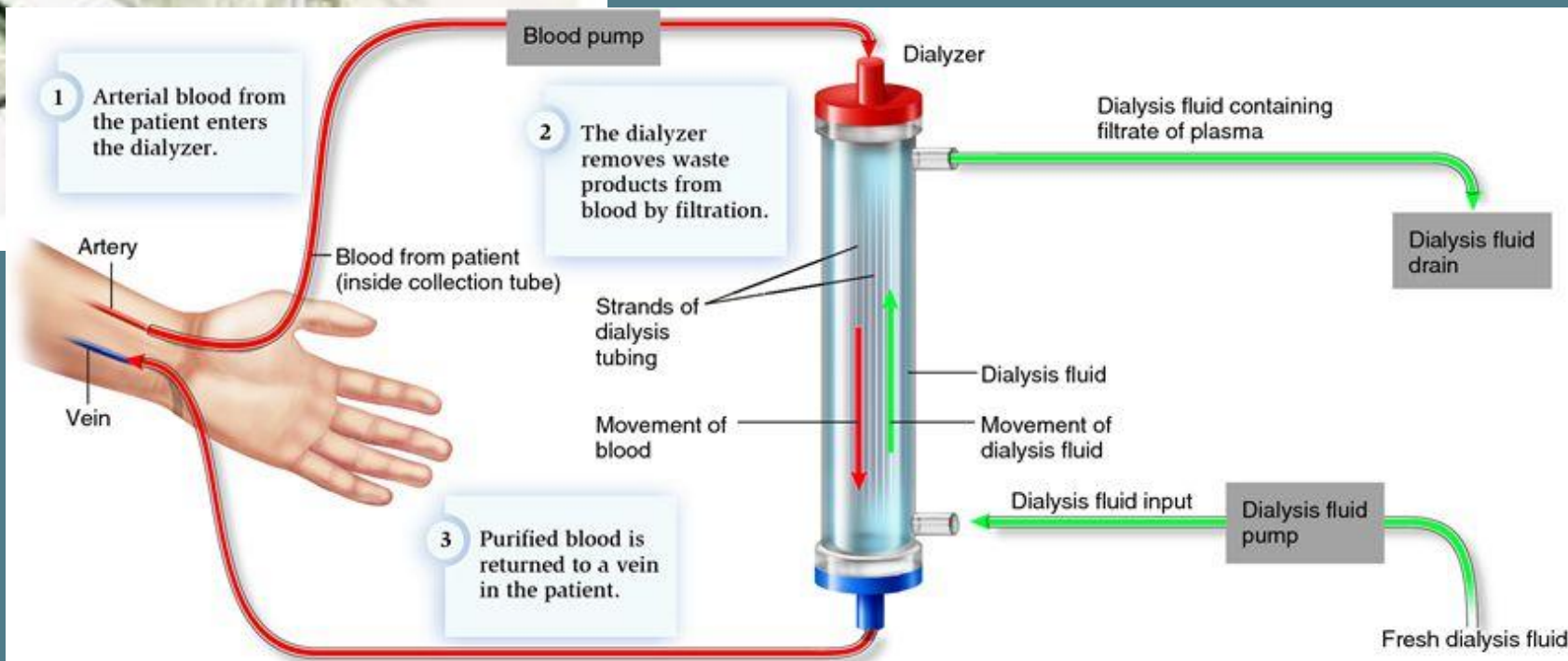
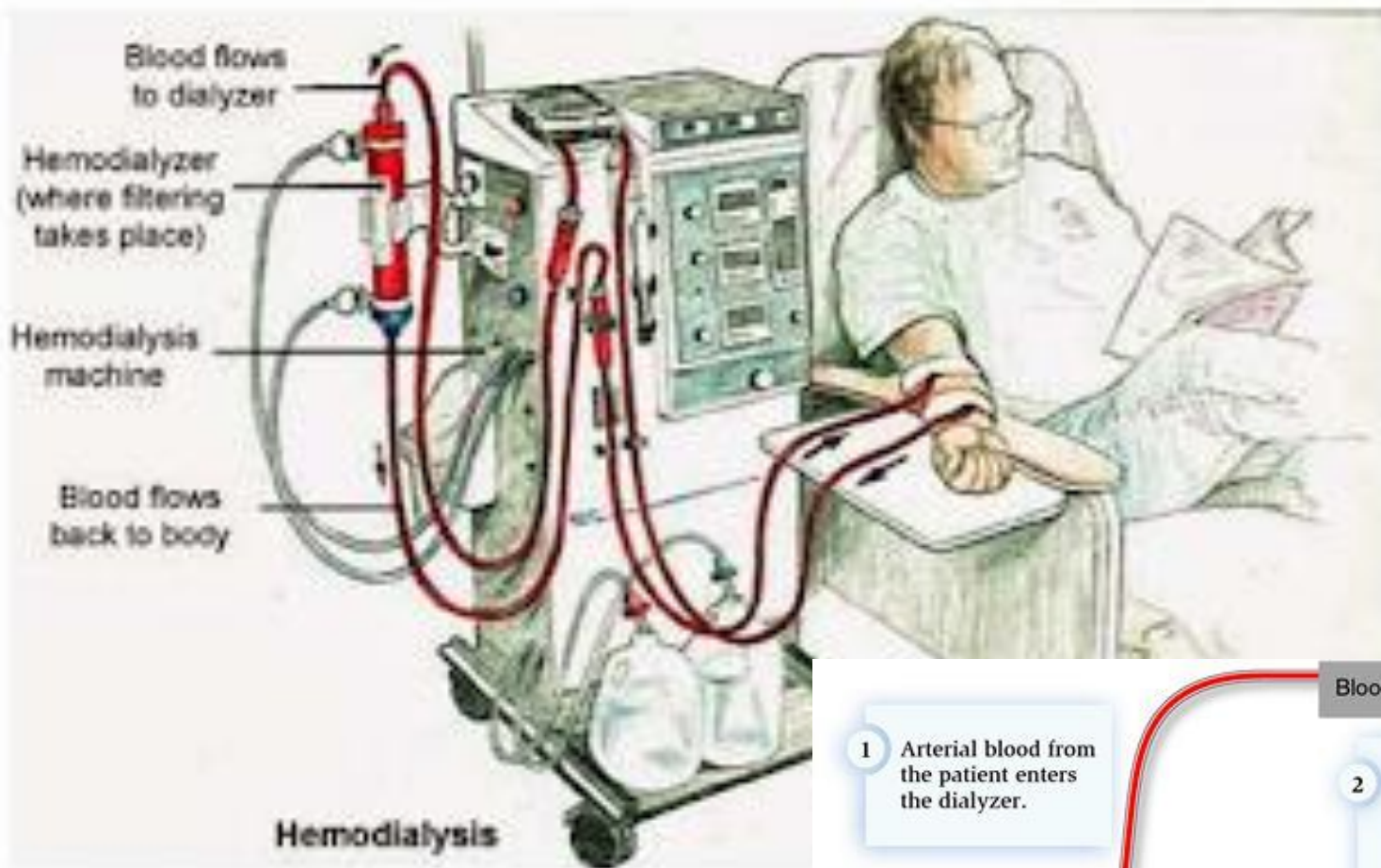
Complication of CAPD

Complication	Cause	Guidelines for practice
Peritonitis -cloudy dialysate fluid -fever, abdominal pain	contamination during dialysate fluid change	- peritoneal dialysis without having to hold the liquid for 2-3 cycles, then bring the first cloudy bag to the hospital. -Be careful to change the dialysate. Keep the environment clean.
Exit cite infection	Incorrect wound care	- dressing once a day and stab the wire in place. -Do not soak in the bathtub
Malnutrition	-albumin loss -loss of amino acids	-Protein intake is recommended 1.2-1.5 g/kg IBW -Follow up on malnutrition
Hyper /hypovolemia)		-Use the appropriate concentration dialysate -record intake output
Hyper/hypoglycemia)	especially in diabetic patients from the concentration of the solutions	-Use the appropriate concentration dialysate - control diabetic diet

Complication of CAPD

Complication	Cause	Guidelines for practice
Electrolyte imbalance	loss of dialysis / anorexia, eating less	-observe abnormal symptoms such as confusion, palpitations, frequent cramps should see a doctor
Respiratory distress	from an increase in abdominal pressure	-Let the fluid flow in-out slowly. - sitting position while undergoing peritoneal dialysis.
Abdominal pain when the fluid flow in and out the abdomen	High osmolarity of the solution / Discharge of the solution too fast	-Let the fluid flow in-out slowly. -Avoid using Hypertonic solution. - Check the quality of the peritoneal dialysate before use.
Bleeding	- May be trauma while insertion - From heavy lifting - Percussion in the abdomen	-Change the fluid in and out 1-2 cycles quickly. - cold compress - surgery to repair
Leakage	-The movement of tenckhoff -initiating peritoneal dialysis before tissue growth at the cuff	- a rest period of 10-14 days after hanging up the tenckhoff -if immediate peritoneal dialysis is required, it must be performed at low volume and performed in a lying position.

Hemodialysis

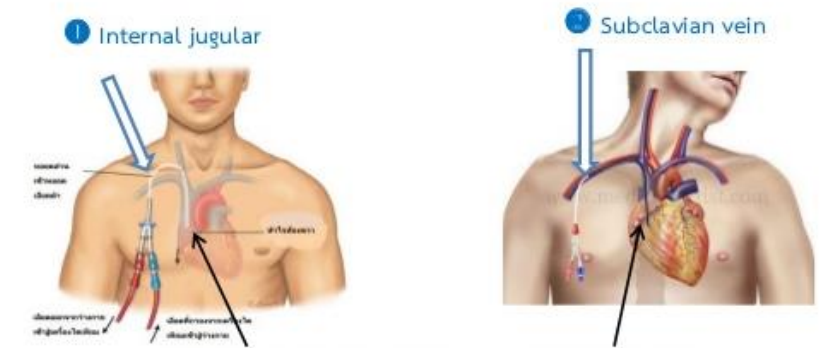


Hemodialysis

- Vascular access

- Temporary

: Noncuffed double-lumen catheter that pierced into a major vein such as femoral vein. Subclavian vein, Internal jugular vein



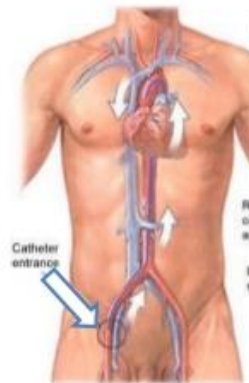
โดยปลายสายของเส้นฟอกเลือดจะอยู่บริเวณ Right Atrium

รูปที่ 12 ตำแหน่งสายฟอกเลือดบริเวณ Internal jugular vein และ Subclavian vein

: Long-term catheter ได้แก่ Perm cath



Femoral vein



Patient self-care with double catheter lumen for hemodialization

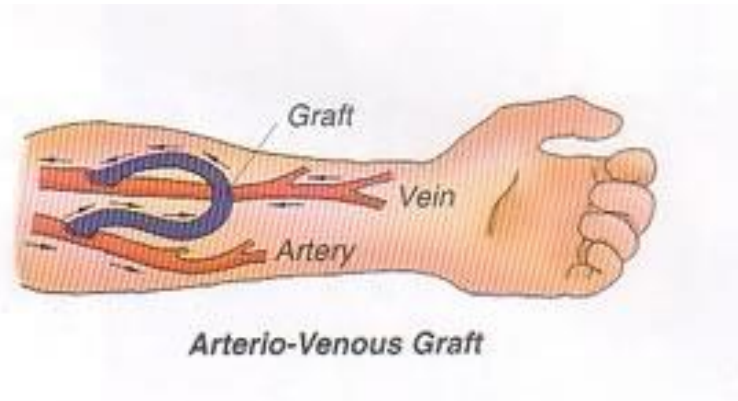
- **The first week after surgery** Do not move your arm or shoulder too much. **should be attached to the side**
- **Be careful** not to get the wound or catheter wet. Do not scratching **the area around the wound.**
- **In the case of inserting a catheter in the groin.** The hip joint should not be bent **and** should not be damp **because it will cause infection.**
- **For neck catheters. Plaster covering** should be avoided or wear a shirt that is pressed over the tip the catheter
- **The following symptoms, you should see a doctor**
 - : The catheter slides out of its original position or broken, have blood flowing out. Don't push the catheter in by yourself. Find a clean cloth to cover the wound and rush to the hospital immediately.**
 - : The arm or face on the same side as the neck that was operated on is swollen, there is pain, high fever**

Hemodialysis

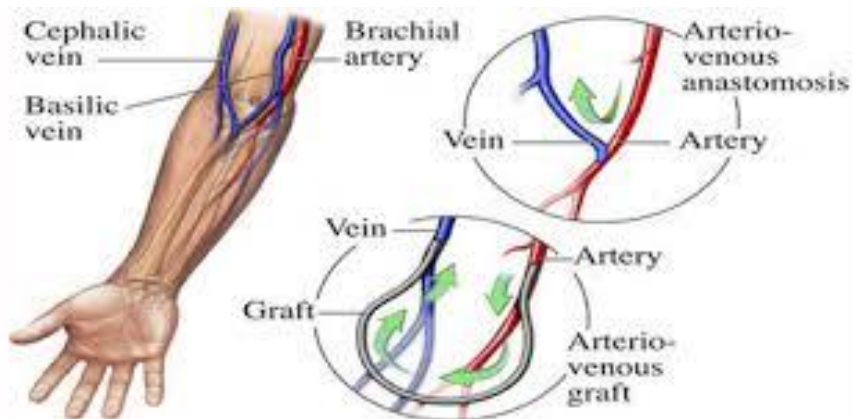
- Vascular access

- Permanent

- : arteriovenous



- : arteriovenous fistula (AVF)



Patient self-care with permanent vascular access for hemodialization

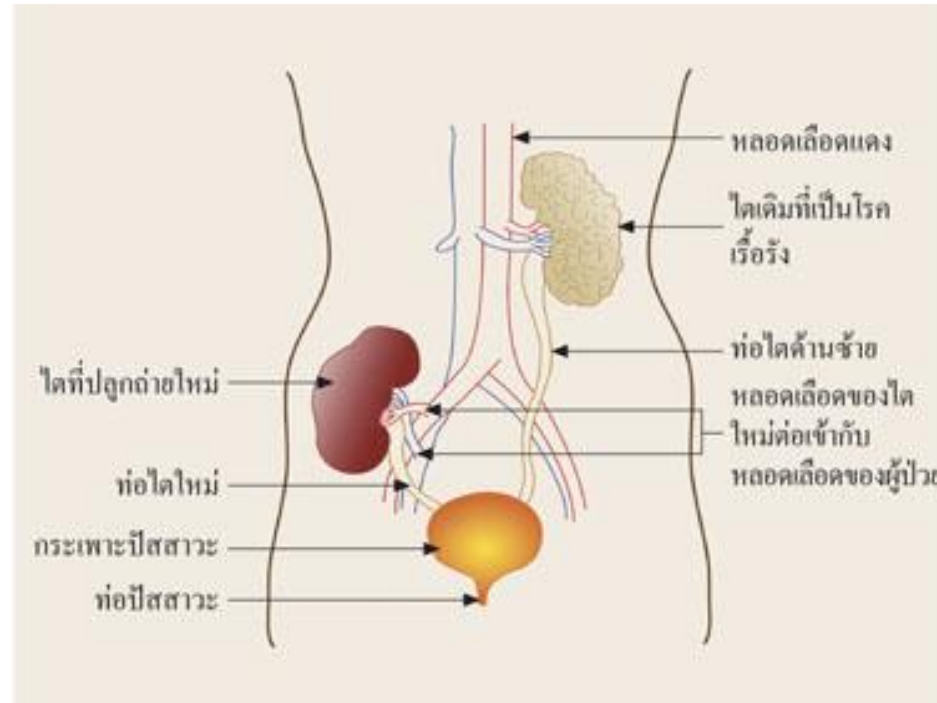
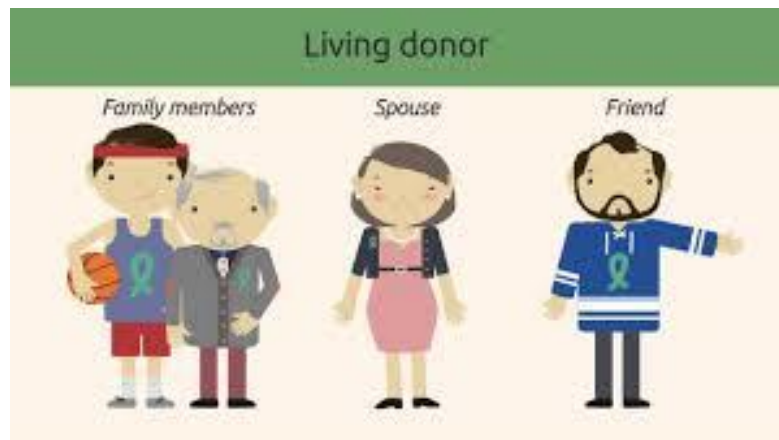
- **Be careful** not to wet the wound 7-14 days **after surgery or until silk cutting.**
- Do not measure pressure, do not draw blood, do not inject drugs, blood transfusion or IV fluids on the side of the operated arm
- **Begin exercising your arm for dialysis by squeezing a rubber ball in your hand.** Clasp-relax, count 1-10, then relax. Do it several times a day, 10-15 minutes each time (**approximately 400 times a day**).
- Shouldn't carry heavy things. **Be careful concussion at the surgical site**
- **The patient use his fingers to palpate the area of the operated arm. The blood flowed so fast that a shuddering sound occurred within the surgical site, indicating that vascular access work well. if palpation does not detect vibration hurry up to see a doctor**
- **Observe the numbness of the tip of the hand. Cool at your fingertips. The fingertips are cyanosis. hurry up to see a doctor.**

Complication of HD

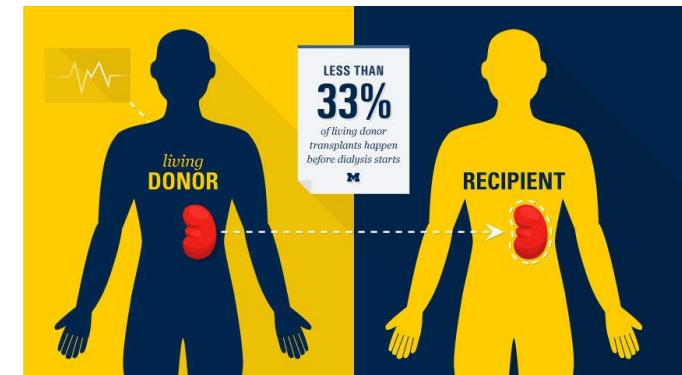
Complications encountered during hemodialysis	การป้องกันและรักษา
Disequilibrium syndrome	<ul style="list-style-type: none">- Blood flow slowly about 150 mL/min.- Take a short time to hemodiaysis 2-3 hours.- Give 50%glucose while HD- Observe disequilibrium syndrome included nausea, vomiting, headache, drowsiness, convulsions and unconsciousness post HD
Hypotention	<ul style="list-style-type: none">-Hold antihypertensive drug before HD-Assessing the weight gain to set the UF appropriately
Electrolyte disturbance and Cardiac arrhythmias	<ul style="list-style-type: none">-Check the K⁺ content in the dialysate solution.-monitor EKG
Bleeding	give an anticoagulant according to the treatment plan correctly

Kidney transplantation: KT

Living donor



Deceased donor



Kidney Transplantation is a technique of implanting a kidney from one person to another who has end-stage kidney disease.

Major contraindication for KT

- Recent or metastatic malignancy
- Untreated current infection
- Severe irreversible extrarenal disease
- Psychiatric illness
- Current recreational drug abuse
- Recurrent native kidney disease
- Limited, irreversible rehabilitative potential

POSTOPERATIVE CONCERNS AFTER TRANSPLANT

Major concern is rejection

- ☐ Drugs given to suppress immunologic reactions: Imuran, prednisone, cyclosporin (Cyclosporin A)

- ☐ Next concern is infection

Drugs given to suppress immunologic reactions and side effect

Cyclosporine

High blood pressure, Increased hair growth, Swollen or inflamed gums, Numbness or tingling of the hands or feet, High cholesterol, kidney toxicity



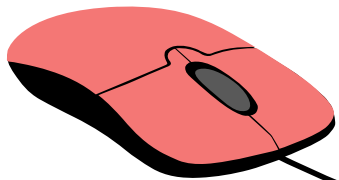
Tacrolimus

Kidney toxicity, High blood pressure, Elevated blood sugar, Trembling and shaking of the hands, Hair loss



Prednisolone

Increased appetite, Gradual weight gain, Acne, Changes in the shape or location of body fat, Stomach pain



NURSING CARE POST KIDNEY TRANSPLANT

TO DETECT REJECTION:

- ☐ Assess for increased temp, pain or tenderness over grafted kidney
- ☐ Assess for decrease in urine output, edema, sudden wgt gain
- ☐ Assess for rise in serum creatinine and BUN values

Instruction for patients after kidney transplantation

- **Be careful about infection in the early stages after kidney transplantation.** Emphasis on air cleanliness, eat clean food and water. **Especially during the first 3 months, avoid being in the community. Avoid touching pets.**
- **Avoid lifting objects that weigh more than 10 kilograms as the wound has not yet closed and may tear.**
- **Be careful not to get the wound wet. If it's red and swollen, you should see a doctor.**
- **To receive the vaccine, you must first inform your doctor that you have received a kidney transplant.**
- **Be careful about being in the sun for a long time. Because there is a risk of skin cancer than the average person.**
- **Be careful about food because immunosuppressive drugs and steroids resulting in high blood fat and high blood pressure**
- **Follow up the doctor's appointments regularly**

Instruction for patients after kidney transplantation

- Sexual intercourse is possible 4 weeks after kidney transplantation, provided that the partner must use a condom.
- Abstain from raw food. Eat clean cooked food. Avoid salty foods, foods high in potassium



ความเสี่ยง ภาวะแทรกซ้อน หลังผ่าตัดปลูกถ่ายไต



New kidney dysfunction signs

1. Body temperature over 37.8 degrees Celsius
2. Blood pressure higher than 180 or severe headache
3. Pain in the area where the new kidney was inserted
4. Swelling of body such as legs, eyelids, hands, feet, weight gain
5. Cough for more than 2 weeks
6. Difficulty breathing, shortness of breath
7. Nausea, vomiting, tiredness
8. Diarrhea for several days
9. Herpes-like blisters all over the body

Nursing care of patients with acute kidney injury and chronic kidney disease

Nursing Diagnosis	Intervention
Excess Fluid Volume r/t decrease glomerular filtration rate and sodium retention, decrease urine output	<ul style="list-style-type: none">-Compare current weight gain with admission or previous stated weight-Auscultate breath sounds, Record occurrence of dyspnea-Note presence of edema-Restrict sodium and fluid intake if indicated-Record I&O accurately and calculate fluid volume balance- Administer diuretic in timely manner, Get hemodialysis or peritoneal dialysis
Altered Nutrition: Less than body Requirement r/t Catabolic state, Anorexia and Malnutrition	<ul style="list-style-type: none">- Identify patient at risk for malnutrition- Assess weight, age, body build, strength, rest level.- Provide diet modification as indicated., Avoid high in sodium-rich food.- Regulate Intravenous line as Ordered., Administer Medications as ordered.
Fatigue r/t effect of chronic uremia and anemia	<ul style="list-style-type: none">-Assess Hct, Hb, capillary refill, conjunctiva., Administer Pack Red Cell as order-Provide diet as indicated-Assess the client daily for appropriateness of activity and provide alternative activity daily living.

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Risk for Infection r/t Contamination of the catheter during insertion, periodic changing of tubings/bags	<ul style="list-style-type: none"> - Be alert for signs of infection (cloudy drainage, elevated temperature) and, rarely, bleeding. - Change dressings as indicated, being careful not to dislodge the catheter. Note character, color, odor, or drainage from around insertion site. - Investigate reports of nausea and vomiting, increased and severe abdominal pain; rebound tenderness, fever, and leukocytosis. - Monitor WBC count of effluent., Administer antibiotics systemically or in dialysate as indicated.
Risk for Injury r/t Clotting, Hemorrhage related to accidental disconnection, Infection	<ul style="list-style-type: none"> - Palpate for distal thrill., Auscultate for a bruit. - Evaluate reports of pain, note extremity swelling distal to access. - Avoid trauma to shunt. Handle tubing gently, Limit activity of extremity. - Avoid taking BP or drawing blood samples in shunt extremity. Instruct patient not to sleep on side with shunt or carry packages, books, purse on affected extremity. - Heparin (low-dose), Antibiotics (systemic and/or topical)
Anxiety r/t change in health status	<ul style="list-style-type: none"> -Access the client’ level of anxiety and physical reactions to anxiety. -Use empathy to encourage the client to interpret the anxiety symptoms as normal. -Explain all activities, procedures, and issue involve the client.

Renal Replacement Therapy

Modality	Advantage	Disadvantage
HD	Convenient	<ul style="list-style-type: none">•Compromise cardiac function•Vascular access
PD	<ul style="list-style-type: none">•Preserve residual renal function•Independent	<ul style="list-style-type: none">•Time consuming•Peritonitis•Hyperglycemia•Abdominal pathology/surgery
KT	<ul style="list-style-type: none">•Normal life style•Longer survival	<ul style="list-style-type: none">•Immunosuppressed state•Operative risk