Urinary System
Assessment & Diagnostic Studies

History
- Subjective data (chief complaint)
- Urinary system questions: urine, micturition pattern, renal pain, fluid changes, exposure to nephrotoxic agents, occupation, h/o renal disease, diet…
  - Changes in amount, frequency, voiding at night, incontinence, ?'s about stream & force, odor? Spasms? Swelling?
- Diseases related to renal problems: HTN, DM, gout, lupus, URI
- Allergies
- Past hospitalizations
- Past urinary procedures: catheterizations or procedures with urinary system
- Medications: nephrotoxic, OTC
- Family history: likelihood of similar problems
- Social & personal history: chemical exposure, smoking, activities, DIET
- Review of systems: may have multiple s/sx involving multiple body systems

Physical
- Objective data

- Inspection: skin- bruises, crystals; mouth; face-edema; ABD and extremities- edema; weight gain/loss; general state of health

- Auscultation: possible bruit & thrill; low pitch murmur = renal artery stenosis

- Palpation: normal size kidney is rarely palpable; bladder not normally palpable unless distended

- Percussion

– CVA (costovertebral angle) region (where the 12^{th} rib and vertebral column intersect); place palm over this area and hit the top of this hand with the ulnar surface of the other hand that has been curled into a fist (thud, no pain)

Nursing Observations
- Accurate I&O: most critical indicator or renal functioning
- Examples of Intake –
- Examples of Output –

• Minimum Urinary Output = 30 ml/hr (note ration of intake to output- should be about the same, report any marked change or gradual decrease) ~ 1500 ml/day
• Observations – passage of stones? Retention? Electrolytes? Weight?
• Preparing for exams: teach; chaperone; confidentiality; may need rectal exam at same time

Diagnostic Studies
- Nursing Responsibilities
  - Coordination of tests – consider health, age, lifestyle, capability to participate, and requirements
  - Patient teaching – inpatient, outpatient, expectations
  - Patient preparation – prepare for each test
  - Comfort measures
  - Follow-up

Diagnostic Studies - Urine
• Urine specimens
– Random (Urinalysis) no special prep
• Specific gravity, pH, color, odor, glucose, ketones, protein, RBCs, WBCs, bacteria, casts, osmolality)

– 24 hour urine (creatinine clearance, lytes, etc) collect in one large container for 24 hrs, if one voiding is discarded must start over; kept on ice; Will look at the excretion rate of Na+, K+, Ca+, Cl-, Phos, uric acid, and proteins. Normal excretion = 1000-2000 ml/hr

– Clean catch or catheter (Urine C & S [Culture & Sensitivity]) aseptic technique; C&S- organisms in urine, kidneys/ureters/bladder normally sterile

– Urine for cytology- malignant cells?

- All urine specimens are refrigerated
  - Specific gravity: measurement of tubules to concentrate or dilute urine; hydration or dehydration
  - pH: reflects ability to maintain normal hydrogen ion concentration (acidity or alkalinity)
  - Color: information about substances
  - Odor: information about substances
  - Glucose: blood glucose level exceeds the reabsorption capacity
  - Ketones: fat metabolism for energy
  - Protein: abnormal glomerular permeability
  - RBC: pathology, not uncommon to never discover the etiology

- WBC: infection, not uncommon to have 3-4 WBC's
- Bacteria: infection
- Casts: + tubular or glomerular disease
- Osmolality: urine concentration, wnl= 500-800 mosm/l
- Bence Jones: multiple myeloma, hyperparathyroidism, osteomalacia
- Creatinine clearance: estimate of GFR, need 24 hr sample and blood sample [creatinine clearance= (urine volume (ml/min) x urine creatinine concentration)/plasma creatinine concentration]
- Phenosulfonphtalein Test: PSP is a red dye and a substance that kidneys normally excrete completely- used to determine renal function, tubular function
- Concentration Studies: r/o tubular dysfunction; 'Fishberg Concentration'

Bladder Scanner: Ultrasound, noninvasive, different settings (male vs female); place probe midline over abd ~ 1.5" above pubic bone aim towards coccyx

Diagnostic Studies - Blood

- BUN (blood urea nitrogen): reflects rise in protein metabolism, or a drop in glomerular filtration rate (GFR)
- Creatinine: balance between creatinine production & filtration-
- Electrolytes & Minerals

See Table - Last page

- Biopsy

– Renal: needle or open; examine tissue; if needle – use ultrasound and/or fluoroscopy to find kidney

- Pre: coag. Times; type & cross; BUN/Cr
  - Absolute contraindications: single functioning kidney, coag disorders, uncontrolled HTN
  - Other contraindications: suspected infection, hydronephrosis, and vascular lesions
- Post: bed rest x 24 hr; vital signs; teaching – s/sx hemorrhage, + hematuria 24 hrs post, avoid strenuous activity

– Brush biopsy of renal pelvis & calyces: catheter with a steel guided wire placed through cystoscope, steel or nylon brush inserted to the level of lesion to obtain sample; pelvis irrigated after specimen obtained with NS

- Post: similar to post cystoscopy; flank pain is common and should disappear in 48 hrs, report severe pain or temp ≥ 101° F

Geriatric Assessment

- Kidney – decrease in amount of tissue, number of nephrons, function of loop of Henle and tubules
  - Less palpable
  - Decreased creatinine clearance, increased BUN & creatinine
- Ureter, Bladder, Urethra – decrease in elasticity, tone, and capacity
  - Palpable bladder due to urinary retention
  - Stress & urge incontinence (hesitancy, frequency, urgency, nocturia)
  - Changes due to prostatic enlargement

Diagnostic	Description	Nursing Responsibility
KUB	• Xray: estimate of kidney position, size, and calcifications	-no special prep
IVP	• visualization of the entire urinary tract; outlines the blood supply of kidney • npo after MN • no metformin for 48 hr after, hold before, r/f *lactic acidosis* • contrast = flushing, warm sensation, salt like taste	-allergies -consent -bowel prep night before -do not give to ↓ renal function -force fluids after
Retrograde Pyelogram	• Xray's • procedure performed with cystoscopy; contrast instilled upwards via catheter • best for clients with ↓ functioning kidneys • catheter & cystoscope	-prep as IVP -consent/ contrast -inform pt of pain and discomfort from distention of renal pelvis and from cystoscope -monitor for flank pain, dysuria, chills, fever for 24-48 hr post exam = *extravasation* -adequate hydration after
Antegrade Pyelogram (Nephrostogram)	• Upper UT: contrast injected percutaneously into renal pelvis or nephrostomy tube • Best for when pt has allergy to contrast, ↓ renal function, or abnormalities that prevent a ureteral catheter passing	-same prep as IVP -monitor for hematuria, infection, hematoma
Renal Arteriogram (Angiogram)	• Looks at blood vessels, supply & circulation • dye injected into renal artery via catheter in femoral artery	-consent -same prep as IVP & sensitivity testing -bedrest 12-24 hrs, leg straight -assess puncture site: hematoma, bleeding; assess peripheral pulses
Renal Scan	• Location, configuration, vascularity, GF, tubular function, excretion • Helpful in determining obstruction of the UT; ARF <48 hrs of onset • Radioactive isotope injected via IV - probes trace isotope -- scan and map	- no diet or activity restriction -should not have any pain during test
Cystoscopy	• Lighted scope inserted under local or general anesth. • Complications: retention, hemorrhage, infection, perforation of bladder	-anesth. Precautions - give IVF if general -May have **pink-tinged urine** post procedure & spasms, **NOT bloody urine or severe pain** -May have **burning, dysuria, & frequency post** procedure -sitz bath, analgesics, antispasmodics, need adequate fluids after, watch for retention
Cystogram	• Dye instilled into bladder with catheter or cystoscope; visualize bladder and evaluate for reflux	-consent -if cystoscope - follow care related to cystoscopy
Cystometrogram	• Insert catheter and instill water or saline into bladder • measures pressure (tone) against bladder	-ask about first urge to urinate, strong urge, & perception of fullness -observe for s/sx of uti after
Biopsy	• Pathology; needle, open, brush • Not done with single functioning kidney, coag disorders, and uncontrolled HTN • Contraindications: suspected infection, hydronephrosis, and lesions	-pre: consent, coag times, cross match-blood, RFP -no asa or warfarin prior -assess for BLEEDING -post: bedrest x 24 hrs, lay on affected side for 30-60 min, VS, hematuria x 24 hrs, no strenuous activities -brush: similar post-cystoscopy; flank pain common, disappears in 48 hrs, report