

Genitourinary



Non-Traditional Overdose: In the Kidney Failure Patient (Hemodialysis)

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Renal Kidney Failure Patient 1998

Hemodialysis Patient 5 years

Kidney Transplant Recipient 2003

An alternative focus in the world of overdose...

On a day to day basis, the hemodialysis patient has to:

- 1) Regulate his every sip of fluid, every meal and snack,
- 2) Take the appropriate medications at the right times and with food
- 3) Attend dialysis treatments on average 3 times a week for 3-5 hours per treatment or 8 hours overnight the duration of his life

...or until successful kidney transplantation occurs.

Kidney Disease - Review

- Chronic (slow) or Acute (quick) onset of kidney disease leads to renal failure
- When failure occurs, it is referred to as ESRD (End Stage Renal Disease)
- There are only 3 treatment options:
 - 1) Hemodialysis
 - 2) Peritoneal dialysis
 - 3) Kidney Transplantation

A short review of the Urinary System

- Functions
 - Removes waste products from blood
 - Helps to maintain constant body fluid volume and composition
 - Helps to provide Homeostasis for the body...
- Components
 - Kidneys
 - Ureters
 - Urinary bladder
 - Urethra

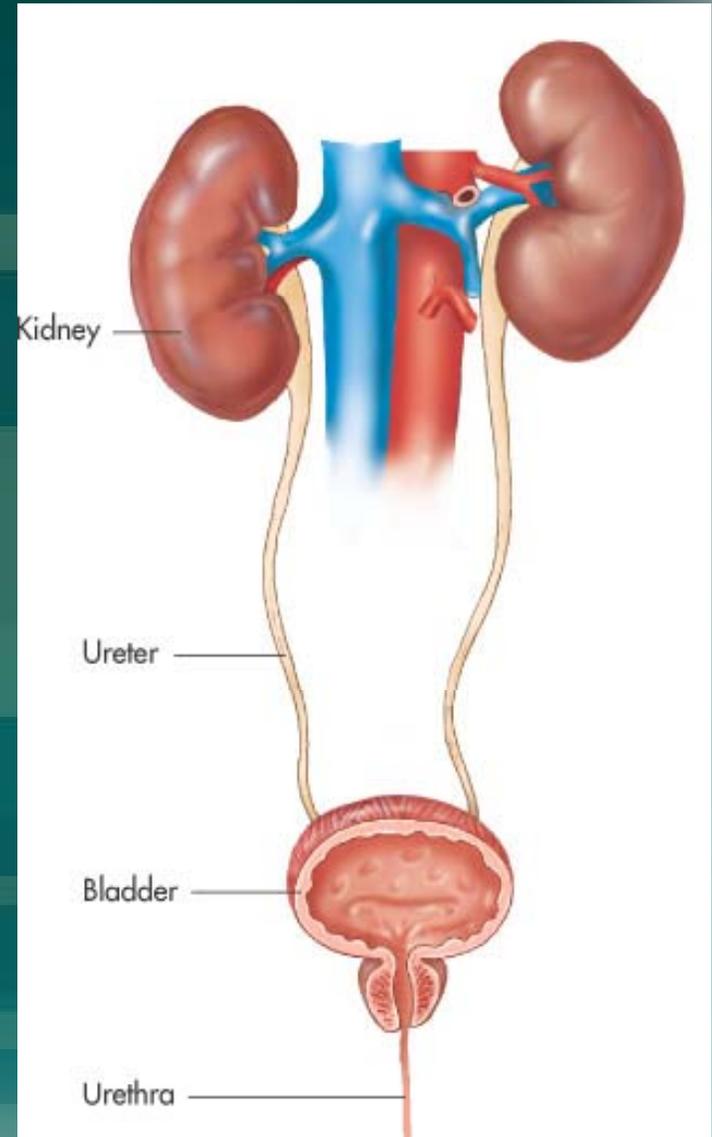


Figure 33-1

- Kidneys maintain **homeostasis** by:
 - Controlling extracellular fluid volume
 - Maintaining proper electrolyte composition
 - Regulating blood pH
 - Eliminating wastes
- **Homeostasis** — a state of equilibrium in the body with respect to functions and composition of fluids and tissues. “Balance”
- Damage to the nephrons or “the working cells” of the kidney, will impair the level of function.

The other two options...for living until transplantation

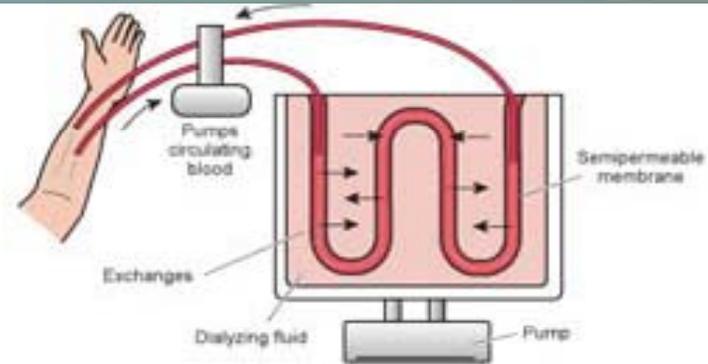
- **Hemodialysis** – Blood filtered by artificial man-made “kidney” (hemo...as in hemoglobin...)
 - 1.) Very strict dietary guidelines
 - 2.) Super strict fluid restriction
- **Peritoneal Dialysis** – abdomen filters fluid and waste through patients’ own peritoneal lining
 - 1) Strict guidelines for diet and fluid intake

Renal Dialysis VS. Normal Kidneys

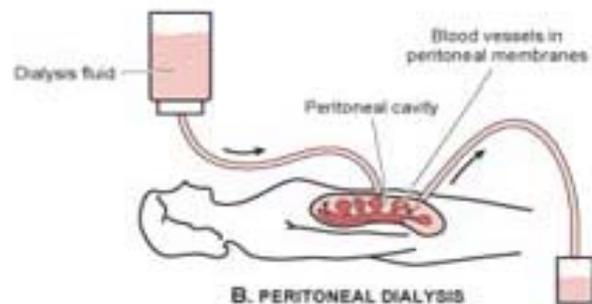
Dialysis is used to normalize blood chemistry as much as possible...in a short regulated period of time.

- Normal kidneys filter all the bodies' blood 3-4 times in a 24 hour period (roughly every 6 hours)
- Hemodialysis patients filter blood 3-5 hours a day, 3 days a week (takes roughly two treatments for one complete cleaning)
Treatments run (Mon, Wed, Fri, or Tue, Thurs., Sat.)
- Peritoneal dialysis patients filter by way of the peritoneum several times per day everyday or once overnight (manually)

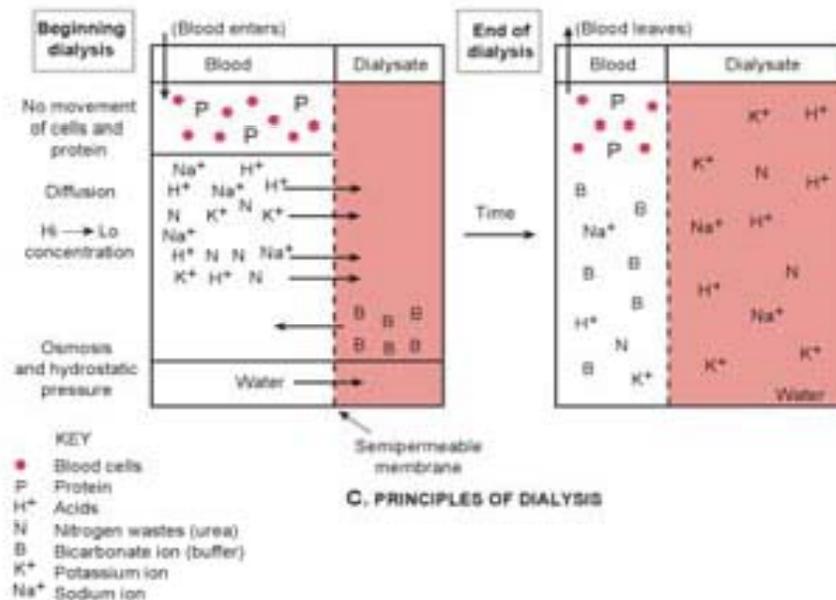
Renal Hemodialysis



A. HEMODIALYSIS



B. PERITONEAL DIALYSIS



Hemodialysis



Venous pressure monitor

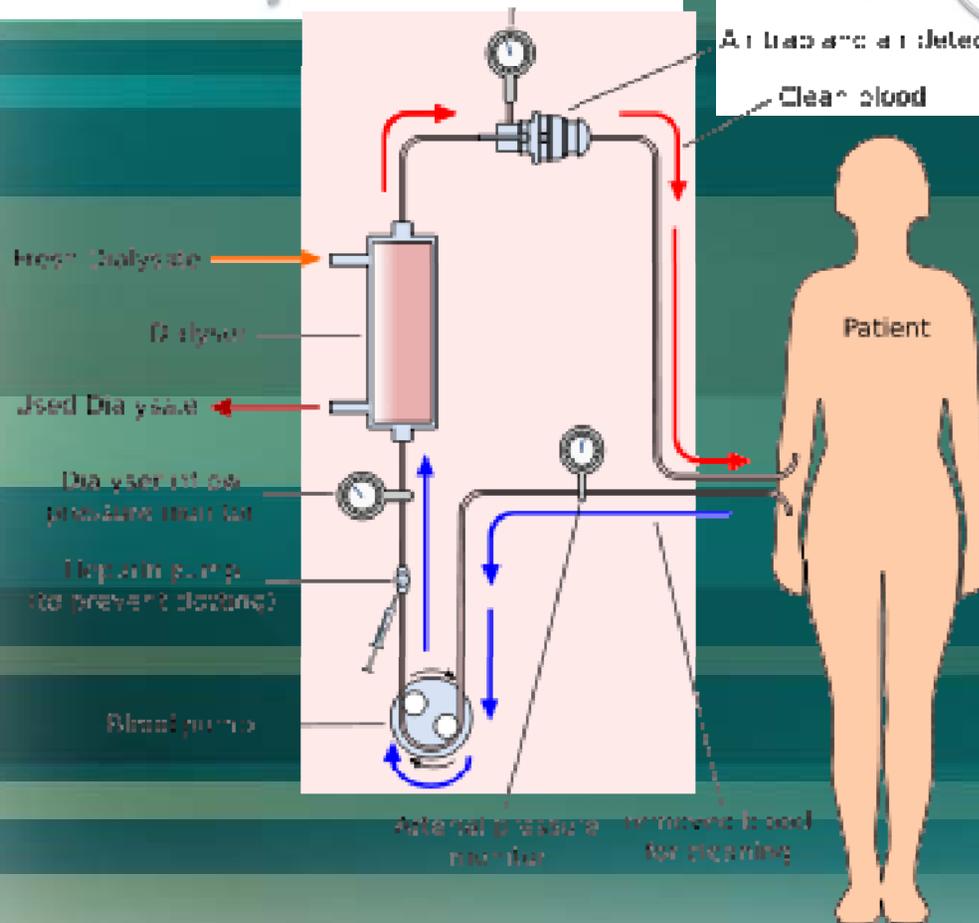


Air trap and air detector

Clear blood

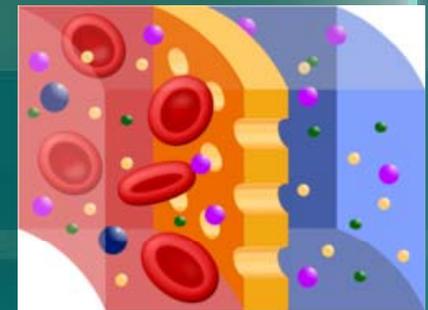


Dialysis Patient



How does a dialyzer clean the blood? (Hemodialysis)

- The dialyzer, or filter (artificial kidney), has two parts, one for your blood and one for a blood washing solution called dialysate.
- A thin membrane separates these two parts. **Blood cells, protein and other important cellular materials remain in the blood** because they are too big to pass through the filter membrane.
- Smaller waste products in the blood, like **urea, creatinine, potassium*** and **extra fluid** pass through the membrane (filter) and are washed away.



In easy terms what do they “pull” (remove) from hemodialysis patients when they are getting treatment?

Below: Dialysate components in
the back room of a dialysis
center.

- 1) Excess Fluid
- 2) Waste and toxins
from the blood
- 3) Help reset PH
balance of
patients body



And now, on to Overdose...

What kind of nontraditional overdose could we be talking about?

- **Hypervolemia** – too much fluid
- **Hyperkalemia** – too much dietary potassium
- **Hyperphosphatemia** – too much dietary phosphorous

Why could almost anything be a possible issue for dialysis patients?

- Medications
- Alcohol –for the sake of the liver...

The Big three...

- **Hypervolemia** – Too much Fluid...
- **Hyperkalemia** – Too much Potassium....
- **Hyperphosphatemia** – Too much Phosphorous....

Hypervolemia – too much fluid

- Too much fluid in the body results in:
 - Circulatory overload
 - Hypertension
 - Respiratory distress
 - Pulmonary edema
 - Peripheral edema
 - Ascites – abdominal edema
 - Congestive heart failure
 - Respiratory failure

Hypervolemia – too much fluid

Too much fluid gain between hemodialysis sessions can cause discomfort.

Patients may experience:

swelling, shortness of breath or high blood pressure.

Fluid gain can also make treatment sessions uncomfortable due to :

muscle cramping and drops in blood pressure during the treatment.

Following recommended fluid intake is an important part of feeling better before and after dialysis.

Hyperkalemia – high potassium

- When kidneys fail they can no longer remove excess potassium, the level builds up in the body. This is called hyperkalemia.
- Some of the effects of hyperkalemia are:
 - nausea
 - weakness
 - numbness or tingling
 - slow pulse
 - irregular heartbeat
 - heart failure
 - sudden death

Hyperkalemia – high potassium

- Dialysis helps regulate potassium.
- Dialysis is effective at removing the excess potassium from the blood.
- Between dialysis treatments, however, levels can rise. High potassium foods must be limited so potassium levels don't get too high before the next treatment.
- High potassium is also likely to occur when dialysis treatments are skipped or shortened. Missed treatments allow potassium to build up to *dangerous levels* in the blood. This can lead to irregular heartbeats or cardiac arrest.

Hyperphosphatemia – high phosphorus

Healthy kidneys typically remove excess phosphorus. When kidney failure occurs, it builds up in the blood. Excess phosphate is called hyperphosphatemia.

Excess phosphorus causes problems with the bones and heart.

Too much in your bloodstream could cause short term symptoms, such as:

- anxiety,
- fatigue,
- breathing difficulties,
- sores due to calcium-phosphorus deposits in the skin
- severe itching.



Hyperphosphatemia – high phosphorus

Over the long term additional symptoms include:

- bone pain and weakness,
- decreased mobility,
- bones that break easily,
- damage to skin and tissue
- uncontrolled parathyroid hormone levels and
- problems with the blood vessels and heart.



When there is too much phosphorus in the blood, calcium is pulled out of the bones. As a result, renal bone disease can develop. In addition, sharp calcium-phosphorus crystals can form and are deposited in body tissues including eyes, joints, heart and lungs.



Breakdown of tissue: Uncontrolled Hyperphosphatemia

From the NKF Hemodialysis page: **Dietary Guidelines for Adults Starting on Hemodialysis**

- Follow the basic renal guide until your dietitian prepares a personalized meal plan for you. You will need to:
- Eat more high protein foods.
- Eat less high salt, high potassium, and high phosphorus foods.
- Learn how much fluid you can safely drink (including coffee, tea, and water).
- **Salt & Sodium**
- Use less salt and eat fewer salty foods: this may help to control blood pressure and reduce weight gains between dialysis sessions. (also decreases thirst)
- Use herbs, spices, and low-salt flavor enhancers in place of salt.
- Avoid *salt substitutes made with potassium.*

Food & Liquid Restrictions Review

- **Fluid Restriction**... **32 ounces per day** (one big gulp for entire day)
- **Includes:** ice, pudding, soup, yogurt, ice cream, all drinks, Jello, dressings, any food that digests in liquid form
- Ideally spaced out... **4 8oz.** drinks per day (3 dry meals and one for a snack)
- or **4 7oz.** drinks (3 meals, 1 for a snack, gives 7oz. for liquid in meals)
- Regular medications (Phosphate binders are taken with each food item) must be figured into the drink schedule.

Food & Liquid Restrictions Review

- Potassium Restriction: (Varies per patient)



- Including: potatoes* (fries, chips), tomatoes (Any red Italian sauce, ketchup, BBQ sauce), bananas, most citrus (except lemons and limes), honeydew, cantaloupe, many other fruits, dairy, most dark green vegetables (Spinach, Broccoli, Brussels sprouts, Kale, Collards), all nuts and legumes, beans (kidney, black, pinto), chocolate

- And the list goes on...



Food & Liquid Restrictions Review

- **Phosphorus Restriction**: High phosphorus foods are mainly from animals. High-protein foods, such as meats, along with dried beans and peas tend to be high in phosphorus.
- **Including**: whole grain anything, anything dairy, chocolate, all nuts, meat, poultry, fish and seafood, wild game, eggs, dried beans and peas, a majority of fast food, all dark soda's, (Phosphoric Acid except root beer...)



Phosphorus Restrictions

Foods, such as **deli meats and colas**, which have phosphates added in processing, **are especially high in phosphorus**.

Phosphates are often used as a preservative or as an ingredient in processed foods. Patients must read food labels carefully and look for phosphorus in the ingredient section such as the ones below:

Phosphoric acid**
Dicalcium phosphate
Monocalcium phosphate
Pyrophosphates
Hexametaphosphate
Polyphosphates
Sodium phosphate



Physical Examination

- Size up – Patient's NOI
- Primary assessment:
 - general impression = appearance important
- Posture
- Level of consciousness (pre or post treatment?)
- Respiratory distress?
- Bleed at catheter or shunt/graft bandage site?
- Skin color
- Apparent state of health + Pt.'s living environment
- Vital signs –no BP on fistula or shunt arm
- Edema or Ascites?

History taking – Renal Pt. focus

- Recent illness
- Past medical history
- Medication use
- Alcohol or drug use
- Nausea or vomiting
- Weight loss
- **Last oral intake***
- Last bowel movement
- Change in bowel habits
- Previous surgeries

Management and Treatment Plan: Hemodialysis patient overdose?

Pre-hospital

BLS & ALS

- Airway & oxygen as indicated, pulse oximetry
- Ventilatory support (CPAP or BVM?)
- Capnography and vital sign monitoring
- Transport – position of comfort, patient empathy & supportive care

ALS

- ECG & IV Access – limited fluids as appropriate* **Circulatory support and Medications** (based on local protocol)

Ultimately what do most need? (to dialyze)

Management and Treatment Plan: Hemodialysis patient overdose?

- Do not permit patient to eat or drink: ~ fluid limitations, and most food has potassium, or phosphorus (Top three focuses to throw “Hemo” patients off balance and exacerbate hyper... _____, _____, _____)
- Don't forget to track:
Medications, Diet, and recent ***Surgeries***, especially for:
Vascular accesses (Fistula's and Shunts) or catheters

Conclusion: Overdose in Hemodialysis patients

It's very difficult for the hemodialysis patient to manage their lives from a personal healthcare perspective. It's easy to see how they could get into trouble...with the **Big Three...**

Your professional courtesy, astute assessment of patient and history will highlight risk factors vs. patient complaint,

...that will allow identification of current and potential issues.

Conclusion: Overdose in Hemodialysis patients cont.

- With a growing population of Renal Failure patients in our community and across the Country...

There are increased numbers of EMS calls to homes, dialysis centers, and increases our likelihood of receiving patients that may present with:

Chest Pain/CHF,
Respiratory Distress & Failure,
Dysrhythmia,
Anxiety,
Fatigue,
Irregular Heart Beat,
Bradycardia (Slow Pulse),
Hypertension & Hypotension,
General & Peripheral Edema,
Circulatory overload & Pulmonary Edema,
Cardiac Arrest,
and many other signs and symptoms...

All from Kidney failure - Hemodialysis patients

Resources:

- www.UNOS.org
- www.Kidney.org
- Emergency Care of the Sick and Injured, 10th edition 2011
- Mosby's, Paramedic Textbook, 4th edition. 2012
- www.Davita.com
- Eric's personal experience and patient handouts

Questions?



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