Fluids and electrolytes are vital for regulating and maintaining virtually every aspect of the body’s functioning. Body fluid—mainly water—makes up about 2/3 of an adult’s total body weight. The amount of fluid and how it is distributed in the body varies according to age, gender and body build.

Lean body muscle mass is rich in water, while adipose tissue (fat) is nearly water-free. The leaner the person, the greater the proportion of water in relation to total body weight. This is true for gender and age, as well. Women tend to have a lower water-percentage weight than men because of the higher concentration of fat content in their bodies. Similarly, as we age, we are predisposed to have a lower water-weight percentage overall as a result of a decrease in our muscle mass content.

Fluid in the body is located in 2 major compartments: the intracellular space and the extracellular space. Extracellular fluids (ECF) are further divided into intravascular fluid (blood plasma), transcellular fluid (water within the epithelial-lined spaces) and the interstitial fluid (tissue spaces surrounding the cells).

Electrolytes, or ions, are small, electrically charged elements located in body fluid, tissue and blood. They are critical in maintaining proper cellular activity, facilitating oxygenation, controlling fluid and acid-base balance as well as many other important body functions. Common electrolytes include sodium, potassium, calcium, phosphorus, magnesium, chloride and sodium bicarbonate.

Body fluids are electrically neutral and the distribution of electrolytes varies within the extracellular and intracellular fluid. These levels are controlled by hormones (renin, aldosterone and antidiuretic hormone). Electrolytes function at an optimal level within a narrow range, and any shift, however small, can have a significant effect on bodily functions.

Sodium is concentrated in the extracellular fluid and potassium in the intracellular fluid. These two electrolytes have a reciprocal relationship. For example, following depolarization of cardiac cells, the sodium-potassium pump facilitates the return of these electrolytes to their respective compartments, during repolarization. In the repolarization process, sodium does not move back to the extracellular area passively, so energy use is required to facilitate this movement. As the sodium is transported into the extracellular fluid, potassium shifts back into the intracellular space to maintain neutrality. Proper balance is essential for muscle coordination, cardiac function, fluid absorption and excretion, neuromuscular function and appropriate mental activity.

Potassium is the most abundant cation in the intracellular fluid. Discovered by Sir Humphrey Davy in 1807, potassium is named for potash, and is denoted in the periodic table as K+ for the Latin word kalium. Normal serum potassium levels range from 3.5-5.0 mEq/L. Normal intracellular fluid levels are about 140 mmol/L. Ninety eight percent of potassium is intracellular. Because of its high concentration within the cell,
Definitions
- Alternative medicine: practice of healing that is based on religion, tradition, pseudoscience that has little base in evidence gathered by the scientific method. Any type of healing that does not use medications to help a person become better. Some examples would include homeopathy, acupuncture, chiropractic, traditional medicine, traditional Chinese herbal medicine, Ayurveda, and faith healing.
- Aromatherapy: a type of herbal medicine that uses natural smells and blends to heal and cause a change in a person. Considered a type of alternative medicine.
- Essential oil: considered secondary metabolites that are created and stored by the plant as volatile oils. Can be produced in fruit peels (citrus), gums and resins (frankincense, cinnamon, and myrrh), flowers (rose and lavender), leaves (sage, lemon balm, geranium, and peppermint), barks (cinnamon and sassafras), needles (pine and fir), roots (vetiver and valerian), grasses (lemongrass and palmarosa), rhizomes (ginger), and seeds (fennel, anise, cumin, celery, dill, and coriander). Companies use various methods to extract and distill the oils from plants.
- Grading of essential oils: aromatherapy is unregulated by the US government so quality and purity of essential oils vary from one product to the next and could be synthetic even if the label says “natural”. There are some gradings that can be used:
  - Food Chemical Codex (FCC) rating: standard of Food and Drug Administration (FDA). Essential oils with this rating can be used as food flavoring or additive and is safe for consumption.
  - United States Pharmacopoeia National Formulary (USP-NF) grade: follows the standard set by USP for compounding medications to be considered as “medicinal grade”.
  - However, even with FCC and USP-NF rating, this does not guarantee quality. To be more certain about quality, the label should say “pure plant essential oil” instead of “fragrance oil” or “perfume oil”. Pricing and distillation percent are other indications of quality and concentration.

Uses for essential oils
- Essential oils have many uses other than being something nice to smell. They can elicit responses and change moods, depending on which oil is used. Smells trigger the brain to send signals to the body or other parts of the brain and stimulate chemical release and regulate glands. For example, marjoram can stimulate the raphe nucleus to trigger serotonin release to help sleep.
- Examples of other uses: massages, soaks, soap, food, help fall asleep, inhalation, well-being, health, stress reliever, aphrodisiac, wound healing, bug spray, energizer.

<table>
<thead>
<tr>
<th>Essential Oil</th>
<th>Characteristics</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamomile</td>
<td>Sweet, fruity, herbaceous</td>
<td>Antibacterial, antiseptic and disinfectant, anti-inflammatory, treatment of burns, sedative and calming. Roman chamomile: treatment of nervous conditions and insomnia</td>
</tr>
<tr>
<td>Citronella</td>
<td>Citrusy, slightly fruity, fresh, sweet</td>
<td>Insect repellant, excessive perspiration, fatigue, headache, oily skin</td>
</tr>
<tr>
<td>Eucalyptus</td>
<td>Medicinal, woody, earthy, fresh</td>
<td>Cooling, anti-inflammatory, antiseptic, antibiotic, diuretic, analgesic, and deodorizing. Effective against coughs and colds and used as bug repellant</td>
</tr>
<tr>
<td>Geranium</td>
<td>Floral, fresh, sweet, fruity</td>
<td>Sedative, help relax and cope with pain, antiseptic and astringent</td>
</tr>
<tr>
<td>Lavender</td>
<td>Flowery, fresh, sweet, herbaceous, camphorous</td>
<td>Effective in treatment of burns and scalds. Natural antibiotic, antiseptic, antidepressant, sedative, and detoxifier</td>
</tr>
<tr>
<td>Lemon</td>
<td>Citrus</td>
<td>Water purifier, antiseptic, antibacterial, treatment of verrucas, insect bites, tension headaches, digestive system stimulation</td>
</tr>
<tr>
<td>Peppermint</td>
<td>Minty, sweet</td>
<td>Digestive, helps with respiratory system and circulation, anti-inflammatory and antiseptic, mice, fleas, and ant repellant</td>
</tr>
<tr>
<td>Rosemary</td>
<td>Herbaceous, medicinal, sweet, fresh</td>
<td>Physical and mental stimulant, treatment of muscle sprains, arthritis, rheumatism, depression, fatigue, memory loss, migraine headaches, coughs, flu</td>
</tr>
<tr>
<td>Tea tree</td>
<td>Medicinal, fresh, woody, earthy, herbaceous</td>
<td>Antiseptic, antiviral, antibacterial, antifungal</td>
</tr>
</tbody>
</table>
Essential oil properties

Essential oils have different properties that enable them to be used for other purposes. Some can be put directly on skin or ingested while others need to be diluted in a carrier oil before use. Some may cause hepatotoxicity if ingested in concentrated doses. Additionally, some may cause skin irritation or are photosensitive and break down easily to become rancid. Therefore, aromatherapy can cause harm if precautions are not taken.

Ways to use concentrated essential oils

- Inhaled
  - Baths: can add up to eight drops of essential oil to baths after the water is run. Breathe deeply and soak for at least ten minutes. ***some essential oils do need to be diluted in vegetable oil first before use
    * Good for skin problems, circulatory problems, respiratory symptoms, stress and nervous tension, insomnia, muscular and menstrual pains.
    * Safe oils to use: lavender oil, clary sage oil, rose oil, geranium oil, frankincense oil, sandalwood oil, eucalyptus oil, cedar oil, fir oil, pine oil, pinon pine essential oil, spruce oil, and juniper oil.
  - Vapors: pour into a bowl of hot water and breathe in through nose for at least one minute.
  - Diffusers: using one to six drops, place on top of clay, glass or metal tray that is heated by candle to be released into the atmosphere.
    * Energy blend: three drops of lemon, five drops neroli, two drops ginger. Put directly into diffuser or with two tablespoons of carrier oil.
  - Protection: due to its antimicrobial properties, oils such as tea tree and lavender can be inhaled to protect against MRSA. More research needs to be done however.

- Oral
  - Dry cough: mix two drops of eucalyptus and lemon oil in two tablespoons of honey. Intake is one teaspoon in six ounces of warm water.
  - MRSA: studies show that when taken with amoxicillin, lemongrass oil can lower the MIC and work synergistically with antibiotics.

- Topical
  - Perfumes: dissolve in alcohol, distilled water, or witch hazel and spray on the body.
  - Wound care: for minor abrasions, clean area with five drops of lavender, tea tree, red thyme, neroli, or frankincense in bowl of warm water. Afterwards, apply one drop of oil directly to skin.
  - Bug repellent: 50-75 drops total in combination of citronella, clove, lemongrass, lemon eucalyptus, cedarwood, rosemary, tea tree, eucalyptus, cedar, lavender, peppermint, basil, rose geranium, cinnamon oil, thyme, lemon, or orange. Can be added to a 4 oz clean spray bottle with 2 ounces of distilled or boiled water and 1 oz of witch hazel or vodka and sprayed on.
  - Massage: add essential oil to vegetable oil to use as massage oil. Ratio is maximum five drops of essential oil to one teaspoon of base vegetable oil.
    * For dry cough: use 3 drops eucalyptus and two drops thyme in one teaspoon vegetable oil and rub on back and chest.
    * Muscle pain: two drops lavender and rosemary in four teaspoons of carrier oil and massage on skin.
    * General headache: three drops lavender and/or one drop peppermint in one teaspoon carrier oil and massage around the temples and base of skull and hairline.

Side effects of essential oil use

- As noted before, essential oils can cause issues if not used properly.
- Citrus and needle oils: can become an irritant to skin over time. To determine if irritant, test on small patch of skin before putting on larger area.
- Citrus oils: photosensitive and will make skin more sensitive with sun exposure; avoid putting on skin before exposure to sunlight.
- Peppermint oil: avoid in children under two and a half years due to strong cooling sensation.
- Clove and cinnamon oil: strong allergenic agents and can provoke skin sensitization when applied to skin. Less issues are noted with ingestion.
- Thyme, oregano, and savory oils: skin irritants. Mainly used internally.
- Juniper oil: at high concentrations, may irritate and/or damage kidney.
- Sage, thuja, wormwood, hyssop oil: can be neuro- and hepatotoxic at high enough concentrations.

Article by Christie Vu, Pharm D Candidate
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potassium exerts some influence over intracellular osmolality and volume. Maintaining this difference is imperative for excitable tissues to depolarize and generate action potentials. Potassium is also involved in regular cellular maintenance, cell volume homeostasis/osmolality and transmission of nerve impulses. Potassium is involved in cellular metabolism, regulating protein synthesis and glucose use and storage, as well. It also affects the body’s pH balance on the basis of its capacity to respond to and exchange with hydrogen ions.

Potassium is not easily stored in the body and requires daily consumption to maintain appropriate levels for body functions. The majority of foods contain at least some potassium. Eggs, bread and cereal grains have the least amount of potassium. See table for potassium-rich foods.

<table>
<thead>
<tr>
<th>FRUITS</th>
<th>VEGETABLES</th>
<th>MEATS/OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apricots</td>
<td>Artichokes</td>
<td>Almonds</td>
</tr>
<tr>
<td>Bananas</td>
<td>Asparagus</td>
<td>Roast Beef</td>
</tr>
<tr>
<td>Dates</td>
<td>Beets</td>
<td>Turkey (dark meat)</td>
</tr>
<tr>
<td>Figs</td>
<td>Brussels Sprouts</td>
<td>Chocolate</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>Mushrooms</td>
<td>Lentils</td>
</tr>
<tr>
<td>Kiwi</td>
<td>Potato (sweet and white)</td>
<td>Milk</td>
</tr>
<tr>
<td>Mangos</td>
<td>Pumpkin</td>
<td>Nuts</td>
</tr>
<tr>
<td>Melons</td>
<td>Tomatoes</td>
<td>Salt substitute</td>
</tr>
<tr>
<td>Nectarines</td>
<td>Spinach</td>
<td>Yogurt</td>
</tr>
<tr>
<td>Oranges</td>
<td>Squash</td>
<td></td>
</tr>
<tr>
<td>Papayas</td>
<td>Turnips</td>
<td></td>
</tr>
<tr>
<td>Pears</td>
<td>Yams</td>
<td></td>
</tr>
<tr>
<td>Pears</td>
<td>Zucchini</td>
<td></td>
</tr>
</tbody>
</table>

The movement of potassium in and out of the cells may influence serum levels a great deal. Because potassium levels in the extracellular fluid are so low, even small changes can seriously affect physiologic activities. The sodium-potassium pump is the primary controller of the extracellular fluid potassium level, which works to move excess sodium out of the intracellular fluid, and potassium from the extracellular fluid back into the cell. Circulating insulin also helps to maintain the level of potassium within the cell. The kidneys are also regulators of potassium, controlling excretion, even as intake varies. Up to 80% of potassium is eliminated through the renal system. Other routes of elimination include the GI tract and sweating.

Hyperkalemia is a potentially life-threatening situation in which the serum potassium level exceeds 5.0 mmol/L. It may result from excessive intake of potassium and potassium-containing substances, impaired elimination of potassium, altered distribution from the intracellular to extracellular spaces or cellular injury.

It is difficult for excessive intake of potassium to occur with adequate renal function and other intact regulatory mechanisms (as long as they are intact). Individuals with impaired renal function may experience significant hyperkalemia with increased potassium consumption in foods and some salt substitutes. Parenteral medications, such as penicillin and carbencillin contain significant amounts of potassium. Impaired renal excretion from renal failure, tubular defects, or hypoaldosteronism affects the body’s ability to remove potassium effectively. Renal insufficiency or failure is characterized by a decrease in glomerular filtration rate; the rate at which blood is filtered in the glomeruli of the kidney. This decrease in renal perfusion affects all of the functions the kidneys perform for the body, among them, the ability to rid the body of excess potassium. Specific defects in renal tubule transport may elevate serum potassium levels. Medical conditions include sickle cell disease, obstructive uropathy, renal allograft, pyelonephritis and interstitial nephritis.

Because aldosterone helps regulate potassium levels and excretion, any condition that produces hypoaldosteronism will adversely affect potassium excretion. Primary adrenal insufficiency (Addison’s disease) occurs when the adrenal glands are damaged and unable to produce cortisol and aldosterone. This hinders the body’s ability to retain sodium and water and to excrete potassium. In addition, chronic constipation may interfere with normal intestinal excretion of potassium. Because about 20% of potassium is eliminated through the intestinal tract, long-term constipation issues may decrease enteral removal of potassium and cause hyperkalemia.

Medications may interfere with normal excretion mechanisms of potassium. Potassium-sparing diuretics facilitate the buildup of potassium in the body by blocking its excretion. Nonsteroidal anti-inflammatory drugs may cause elevated potassium levels by a variety of means: they suppress prostaglandin synthesis, and they suppress aldosterone synthesis. This combination can cause a dangerously high level of potassium in the blood plasma, especially with renal insufficiency. Other medications, including cyclosporine, tacrolimus, ACE inhibitors and angiotensin-II receptor antagonists, may also cause a reduction in aldosterone and the GFR, facilitating the development of hyperkalemia. In addition, many herbal remedies will elevate potassium levels. Noni juice, dandelion, horsetail and alfalfa have high potassium content. Other herbals (lily of the valley, Hawthorne berry, dried toad skin, and Siberian ginseng) affect body functions such as insulin and aldosterone levels and kidney function.

Insulin enhances the cellular potassium uptake and facilitates normal serum potassium levels through its ability to stimulate the sodium-potassium pump. Elevated extracellular potassium...
um levels stimulate increased insulin secretion to promote the return of potassium to the cell. So, an insulin deficiency reduces the body’s ability to shift the potassium intracellularly, making one susceptible to hyperkalemia.

Many medications may cause elevated serum potassium levels by facilitating intracellular fluid-to-extracellular fluid shifts; digoxin and beta-blockers affect the sodium-potassium pump.

Diagnosis of hyperkalemia may be made with elevated laboratory serum potassium levels and reinforced through physical assessment findings, a thorough clinical history and medication review. Additional lab work may be ordered to facilitate the differential diagnosis (CBC, ABG, BMP/Chem 7, BUN, creatinine, LFTs and a complete urinalysis). Care should be taken to rule out false lab findings, especially with a difficult “stick”. With hemolysis of cells, leakage of potassium will cause an elevated lab result. This can occur with technician error, fist clenching during phlebotomy and dramatic venipuncture.

Manifestations of hyperkalemia include cardiac dysfunction exhibited by EKG changes and cardiac dysrhythmias. Neurological alterations may also be manifested, demonstrated by fatigue, irritability and mental confusion. Neuromuscular manifestations include muscle cramps, weakness, speech problems, paresthesias to the face, hand, feet and tongue, tetany and paralysis. Elevated potassium levels may also cause GI hyperactivity with complaints of nausea, diarrhea and abdominal cramping. In late stages of hyperkalemia, paralysis of the respiratory muscles may progress to respiratory arrest.

Treatment of hyperkalemia is initiated by eliminating sources of potassium intake. Providing a low-potassium diet (apples, cherries, peaches, watermelon, carrots, cabbage, corn, white bread, white rice, chicken and tuna) will help reduce the amount of potassium ingested. Enteral tube feedings should be specially prepared to provide low potassium levels based on lab values. In addition, any medications that might cause or aggravate hyperkalemia (ACE inhibitors, digoxin, beta-blockers, PCN) should be monitored carefully. These measures should suffice for those with a functioning renal system. Those with renal insufficiency may require more intensive measures. Medications that cause a shift in potassium from the extracellular fluid to the intracellular fluid may provide a temporary improvement in status (calcium salts, bicarbonate, insulin/glucose, beta agonists). Definitive treatment requires the removal of potassium from the body. The use of ion-exchange resins, such as sodium polystyrene sulfonate (Kayexalate), diuretics and hemodialysis are methods that achieve this elimination. Exchange resins work by exchanging gut cations – most importantly, potassium - for sodium ions that are released from the resin. Each gram of Kayexalate administered orally or rectally, may remove approximately 1 mEq of potassium. Exchange ions can cause constipation and are usually administered with a laxative which serves a double purpose: preventing the constipation and promoting the elimination of the potassium from the gut once it binds to the resin. An oral dose of Kayexalate, given with sorbitol, an osmotic cathartic, will produce results within one to two hours. Rectal enemas of 50 mg of Kayexalate, administered and then retained for 30 minutes, will produce effects in about ½ an hour. Patients with poor cardiovascular reserve should be monitored carefully due to the potential of fluid volume overload. Although generally considered safe, the combination of a resin and sorbitol has been reported to cause intestinal necrosis. Because they are sometimes packaged together, caution should be used with administration.

Diuretics, such as loop (furosemide), and to a lesser degree, thiazides (HCTZ) will remove potassium through the kidneys and renal system. They act by diminishing sodium reabsorption at different sites in the nephron, increasing urinary sodium, water and potassium losses. In those with functioning kidneys, this is a viable method for potassium removal. Even in those with chronic renal failure, this treatment has some value if some renal function exists. Other methods for emergency situations include hemodialysis, peritoneal dialysis, and fludrocortisone. Regardless of the method chosen, the re-emergence of hyperkalemia is a concern, particularly if the original cause of the hyperkalemia has not been addressed.

Nursing care should be multi-focused. Because potassium affects the functioning of all of the body systems, it is important to recognize abnormalities that may occur. A thorough head-to-toe assessment is critical to determine any physiologic changes in function. Cardiovascular status should also be evaluated by listening to heart sounds to note irregularities. Vascular perfusion should be monitored by assessing peripheral pulses and capillary refill. Neurological assessment should also be obtained, observing for fatigue, sleepiness, altered level of consciousness, headache, muscle weakness/cramping and paresthesias. As far as the respiratory system, assessment should be made of lung sounds, respiratory rate and depth, and oxygen saturation levels. Lab monitoring is extremely important, as well, specifically sodium and potassium levels as well as renal function. Intake and output measurements should be maintained. A health history should be reviewed and a medication reconciliation performed, including all prescription and over-the-counter medications, and herbal and nutritional supplements. Monitoring for the recurrence of hypokalemia, following interventions to reduce the potassium level is also an important component in nursing care.
Managing Diabetes in the Older Adult

There are currently 3 published guidelines for the treatment of diabetes. Each organization (American Diabetes Association, American Association of Clinical Endocrinologists, and the American Geriatric Society) sets different treatment goals, and emphasizes the importance of individualizing each patient’s treatment. Goals should be personalized based on how long the patient has had diabetes, age, other health conditions, mental status, and whether or not they have complications of diabetes (ex: nerve pain, cardiovascular disease, kidney failure, etc). The A1C goals in the table below are only for adults older than 65 years. These goals are less strict than the goals for adults younger than 65 years.

### Monitoring:

There are multiple different ways to monitor a patient’s glucose control. HgA1C (sometimes referred to as just A1C) is more of a reading that averages the patient’s glucose over the previous 3 months (see chart below). Fasting (before a meal) readings are taken just before eating and allow us to see how the patient’s body controls glucose without any outside sources of sugar. Post-prandial (after a meal) readings should be taken 2 hours after eating. This reading allows us to see how the patient’s body responds to outside sources of glucose. HgA1C should be monitored at least every 6 months in most patients. Once a patient’s A1C is stable for several years, it can be measured every 12 months. When a patient’s diabetes drug regimen is added to or changed, fingerstick testing frequency should be increased.

### Hypoglycemia:

Hypoglycemia (low blood sugar) is a common problem in older adults with diabetes. In fact, the geriatric population is at a higher risk for blood sugar lows than their younger counterparts. Hypoglycemia is always dangerous; however, in the elderly population it can lead to devastating falls due to the dizziness that can occur. Studies have also shown that older adults with a history of severe hypoglycemic episodes have an increased risk for dementia, which is one of the many reasons it is so important to avoid it happening in this population. The initial symptoms of low blood sugar are caused by autonomic nervous system activation with an increased heart rate, nervousness, and a sweating response, all of which should alert the patient to seek outside sources of sugar to facilitate recovery. However, these symptoms are less noticeable in older adults. Hunger can also be a symptom of low blood sugar. As glucose levels fall and brain cell function becomes compromised, dizziness, confusion, fatigue, and progression to coma can occur. Older adults are also at a higher risk for low blood sugar due to a decline in liver or kidney function. Drugs are removed by either the liver or kidneys. As kidney or liver function worsens, the drugs hang around longer in the body. This is particularly an issue for drugs in the sulfonylurea class (glyburide, glipizide, and glimepiride). Insulin is also partly cleared by the kidney, and patients with bad kidney function often need a lower insulin dose. Fortunately, the response to glucose administration is quick, and dramatic recovery normally occurs. Follow the rule of 15 for treating hypoglycemia as you would with any diabetic: Give 15g of glucose, wait 15 minutes and repeat with 15gm of glucose if necessary. Foods like ½ cup of fruit juice, ½ cup regular soda (not diet), 1 small box of raisins, or 1 tablespoon of sugar are all sources of 15g of sugar.

<table>
<thead>
<tr>
<th>Adults &gt; 65 years</th>
<th>ADA</th>
<th>AACE</th>
<th>AGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HgbA1C</strong></td>
<td>&lt; 8%</td>
<td>7-8%</td>
<td>7-7.5% healthy, good functional status 7.5-8% most older adults 8-9% poor health, short life expectancy</td>
</tr>
<tr>
<td><strong>BS before meals</strong></td>
<td>70-130 mg/dL</td>
<td>&lt; 110 mg/dL</td>
<td></td>
</tr>
<tr>
<td><strong>BS after meals</strong></td>
<td>&lt; 180 mg/dL</td>
<td>&lt; 140 mg/dL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HgbA1C</th>
<th>Average BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7%</td>
<td>154</td>
</tr>
<tr>
<td>7.5%</td>
<td>169</td>
</tr>
<tr>
<td>8%</td>
<td>183</td>
</tr>
<tr>
<td>8.5%</td>
<td>197</td>
</tr>
<tr>
<td>9%</td>
<td>212</td>
</tr>
<tr>
<td>9.5%</td>
<td>226</td>
</tr>
<tr>
<td>10%</td>
<td>240</td>
</tr>
<tr>
<td>10.5%</td>
<td>255</td>
</tr>
<tr>
<td>11%</td>
<td>269</td>
</tr>
</tbody>
</table>
Medications

Metformin is the preferred first line agent (unless contraindicated due to renal function), in combination with lifestyle changes like diet and exercise. The new guidelines from the American Geriatric Society recommend using estimated glomerular filtration rate (eGFR) instead of serum creatinine (SCr) to determine whether metformin is safe to use or not. This is because older adults generally have less muscle than younger adults, which can cause their SCr to look low, overestimating their kidney function. "Gliptins" (Januvia, etc), Symlin (pramlintide), metformin, or GLP-1 agonists (Victoza, etc) are reasonable to use in the elderly; these may help avoid hypoglycemia or weight gain that might come with other medications. Individualized insulin regimens (not sliding-scale) are safe to use in older adults that are otherwise healthy, have careful monitoring, and ongoing cognitive assessment.

Medications to Avoid in the Older Diabetic

As previously mentioned, drugs belonging to a class called sulfonylureas (glyburide, glipizide, and glimepiride) should be avoided as they have a greater risk of causing low blood sugar. Glyburide is the worst out of the 3 for causing hypoglycemia. Chlorpropamide is related to the sulfonylureas and should be avoided in the elderly due to its long half-life. Sliding-scale insulin use remains a common practice in nursing homes despite recommendations from the American Medical Directors Association to avoid the practice. In 2012, the American Geriatrics Society added sliding-scale insulin to the Beers criteria for potentially inappropriate medication use in the elderly. This is due to a higher risk of patients experiencing low blood sugar, without effectively managing high blood sugar. Sliding-scales cause more hypoglycemia because they base insulin doses only on glucose levels before meals. This ignores important elements like a patient’s basal metabolic needs, the type and amount of food the patient is eating, their weight, insulin sensitivity, or insulin resistance. Sliding-scale insulin basically puts patients on a blood sugar roller coaster instead of fixing the problem to begin with.

Insulin Timing and Types of Insulin

We know insulin is a "high alert" medicine, but it's still topping the list of medications involved in errors. About 1 in 4 insulin errors leads to patient harm and insulin is involved in about 1 in 3 fatal medication errors. To reduce potential errors, avoid using the abbreviation “U” instead of units, the use of trailing zeros on prescriptions (5.0 instead of 5), and be sure to clarify orders that may be illegible or that use these hazardous abbreviations. There are many different types and brands of insulin on the market. A common misconception is “insulin is insulin, right?” Wrong. While all insulins eventually allow the cells to use glucose, each formula is different. Some formulas like Apidra, Novolog, and Humalog (aka mealtime insulin) have a very fast onset and should be dosed just minutes before a meal in order to avoid low blood sugar. In contrast, long-acting (aka basal insulin) formulas like Lantus and Levemir don’t start working for around 90 minutes and last for close to 24 hours. Due to these differences, it is extremely important to make sure the correct insulin is administered. A lot of the insulins on the market also sound or look similar to other insulins (ex: NovoLOG vs novoLIN, lispro vs Lantus). Grabbing the wrong one can have devastating effects.

Article by Amy Sattler
Pharm D Candidate, Class of 2015
To all the Pharm Notes Family,

Had to share.......Puts a lot of things in perspective!

IF.....
If you can start the day without caffeine,
If you can always be cheerful, ignoring aches and pains,
If you can resist complaining and boring people with your troubles,
If you can eat the same food every day and be grateful for it,
If you can understand when your loved ones are too busy to give you any time,
If you can overlook when those you love take it out on you, when through no fault of yours, something goes wrong,
If you can take criticism and blame without resentment,
If you can resist treating a rich friend better than a poor friend,
If you can face the world without lies and deceit,
If you can conquer tension without medical help,
If you can relax without beer, wine, or liquor,
If you can sleep without the aid of drugs,
If you can honestly say that deep in your heart you have no prejudice against creed, color, religion, gender preference, or politics,

Then you have reached the same level of development as your dog.

Till next time,

Cathy Fuquay
Pharm Notes Editor