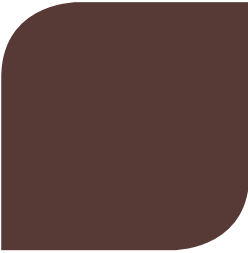


4

Module 4:



Nutrition, metabolism and elimination assessment



Introduction

Good nutrition provides the foundation for effective function in all body systems as it provides the elements needed for energy production, cellular and tissue building and regeneration, and the regulation of body processes. It is a balance between nutrient intake and nutrient demand in relation to energy expenditure by the body. Imbalances between nutrient supply and demand can lead to poor nutrition.

Obesity and malnutrition are problems prevalent in our community and older people are at risk of developing problems in these areas. Malnutrition and obesity (over-nutrition) both have major implications for multi-organ/system problems, decreased immunity and pressure ulcers. Malnutrition is defined as under-nutrition from: reduced intake; nutrient deficiencies (not enough of the right foods) or issues with absorption. In turn, problems associated with disease processes in other systems and external factors, such as medications, poor-fitting dentures or a sedentary lifestyle impact negatively on the nutritional system.

Examination of a person's elimination patterns provides a snapshot of the functioning of the gastrointestinal and renal systems. Normal ageing, changes in activity and exercise, the neurological system and nutrition predispose the older person to develop problems, particularly with constipation and continence.



The gastrointestinal system

The functions of the gastrointestinal system are:

- **Ingestion** – eating food
- **Digestion** – breakdown of the food
- **Absorption** – extraction of nutrients from the food
- **Defecation** – removal of waste products

The upper gastrointestinal system

Food enters the mouth and is chewed by the teeth and mixed with saliva by the tongue. The sensations of smell and taste from the food stimulate the salivary glands located in the mouth to produce saliva. Saliva lubricates food and starts to break it down, particularly starches, by the enzyme ptyalin.

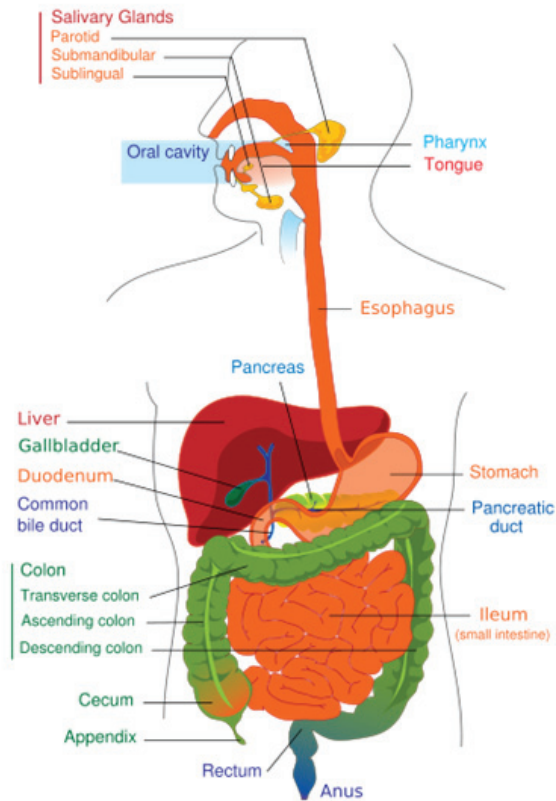
As the food moves back to the pharynx, the bolus stimulates the swallow reflex. As swallowing occurs the epiglottis closes over the trachea to protect the airways from aspiration. Swallowing moves food into the oesophagus where peristalsis moves it into the stomach. The oesophagus is about 25cm long between the pharynx and stomach. Peristalsis is the contraction of the horizontal and longitudinal bands of smooth muscle that respectively stop food moving back towards the mouth and keep the food moving forwards through the gastrointestinal system. The bolus of food enters the stomach via the lower oesophageal sphincter.



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Nutrition, metabolism and elimination assessment

Diagram 1: The gastrointestinal system



The lower gastrointestinal system

The stomach lies transversely just below the diaphragm and to the left of the liver. It consists of three parts: the fundus, the body and the pylorus. The stomach is the widest part of the alimentary canal and acts as a reservoir for the bolus of food, where it may remain for between 2 and 6 hours. In the stomach the food is churned over and mixed with hydrochloric acid and digestive enzymes including pepsinogen, which break down fats and proteins. Stretching of the stomach sends signals to the hypothalamus to control hunger. Food is now chyme and moves into the pylorus where it is released into the small intestine via the pyloric sphincter.

Digestion is completed in the small intestine. The small intestine measures about 7m in an average adult and consists of the duodenum, the jejunum, and the ileum. Both the bile and pancreatic ducts open into the duodenum and provide secretions used for digestion of protein (such as trypsin), fats (lipase) and carbohydrates (amylase).

The surface area of the small intestine is large (about the size of a tennis court) due to folds and villi, and allows for absorption of nutrients and water. There is a large lymph and blood supply to this area, ready to transport nutrients to the rest of the body.

The pancreas is located in the upper abdomen and lies towards the back and behind the stomach. The Islets of Langerhans in the pancreas contain specialised cells (alpha and beta) which produce insulin and glucagon to control blood glucose levels in the body. Insulin is released when blood glucose levels are high and glucagon when blood glucose levels are low. Insulin facilitates the transport to and the uptake of glucose by body cells and tissues. Diabetes occurs when either no insulin is produced (Type 1 diabetes) or resistance of body cells means that not enough insulin is available to meet metabolic needs (Type 2 diabetes). Management of Type 1 diabetes involves the provision of exogenous (external) insulin and in Type 2 diabetes strategies such as weight loss and improvement in fitness decrease the demand for insulin and promote more effective use of what the body provides. Glucagon works on the liver to release and convert glycogen stored there for use by the body.

The liver is located in the upper, right quadrant of the abdominal cavity and extends to the epigastric region. It lies under the diaphragm and above the stomach. Apart from the storage of glycogen, the liver acts as a large reservoir and filter for blood, and is involved in the secretion of bile to the gall bladder where it is released to the pancreas to help with the emulsification of fats; carbohydrate, protein and fat metabolism; the storage of vitamins (A, D, E and K) and the break-down of red and white blood cells (phagocytosis), and some bacteria. The gall bladder is located just beneath the liver.

The large intestine is shorter than the small intestine, but larger in diameter. On average it is about 1.5m long and comprises the caecum, the appendix, the colon (ascending, transverse and descending portions), and the rectum. Food passes from the ileum into the caecum and the ileocecal valve prevents any food or faecal matter returning to the ileum. It is in the large intestine that most water is absorbed. Remaining undigested food residue and other are broken down by putrefaction before reaching the anal canal where the indigestible foods are expelled from the body through the anus.

Urinary elimination

(This is included here, but could also be examined with genital/ reproductive exam. It is included here as part of fluid balance, metabolic and abdominal assessment.)



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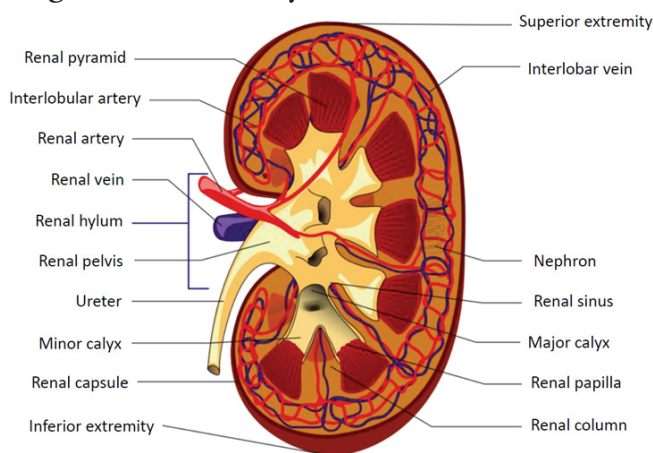
Module 4:

Nutrition, metabolism and elimination assessment

Kidneys

The kidneys filter the blood and dispose of wastes and excess fluid as urine. The kidneys also play a vital role in the “acid-base” balance of the body. They are located in the upper abdomen in the retroperitoneal (toward the back - behind the peritoneum and in front of the lumbar spine) space at around T12-L3 and the right kidney sits a bit lower than the left.

Diagram 2: The kidney



The kidney works closely with the endocrine and respiratory systems to regulate acid-base balance, electrolyte concentrations, extracellular fluid volume, and blood pressure.

The mechanisms involved in the kidneys' functions are filtration, reabsorption, and secretion. The nephron is the main functional unit in kidneys. The process of filtration, reabsorption and secretion results in most of the water and solutes being re-absorbed, and about 2 litres being excreted as urine per day. Urine is made up of 95% water and then various byproducts of metabolism, such as urea.

The kidneys help maintain acid-base balance by regulating bicarbonate levels. This is achieved by re-absorbing bicarbonate into the blood stream and by excreting hydrogen ions as needed.

Extra cellular fluid (ECF) volume is regulated by the kidneys. If ECF is high then aldosterone production is reduced with the result that more fluid is excreted as urine. If ECF is low then anti-diuretic hormone will be released and fluid will be retained rather than excreted. Aldosterone is secreted from the adrenal glands on top of the kidneys and is important in regulating fluid and electrolyte balance. It stimulates the reabsorption of salt and therefore fluid volume, as salt draws water into

the circulatory system. Aldosterone is important for maintaining blood pressure. Regulation and maintenance of blood pressure is also supported through control of ECF volume by the kidneys.

The kidneys influence the production of red blood cells (erythropoiesis) by the bone marrow. The renal system also influences the release and reabsorption of calcium from bones in response to calcium levels in the blood.

Ureters

Urine passes from the renal pelvis into the ureters. The ureters connect the kidneys to the bladder. They are about 30cm long in adults and are muscular tubes that use peristaltic movement to move urine to the bladder. Valves (ureterovesical) prevent the backflow of urine into the kidneys.

Bladder

The bladder is located in the lower abdomen in the floor of the pelvic cavity. In males it lies anteriorly (in front of) to the rectum and in females it lies inferior to the uterus and anterior to the vagina. The bladder wall is made of a layer of muscle (detrusor) and three layers of mucosa that allow the bladder to stretch in response to different volumes of urine. When the bladder stretches the parasympathetic nervous system causes the detrusor muscle to contract and expel urine from the bladder. The internal urethral sphincter (autonomic control—detrusor muscle) and the external urethral sphincter (voluntary control because it is skeletal muscle) open when the detrusor contracts and urine passes into the urethra. They also prevent the back-flow of urine into the bladder.

The stimulus for micturition is usually triggered when there is about 350ml of urine, but it can stretch to hold up to 700ml. The amount of voluntary control a person has over micturition depends on the volume of urine. Females void more frequently than males, because the bladder shares space with reproductive organs, whereas this is not the case for males.





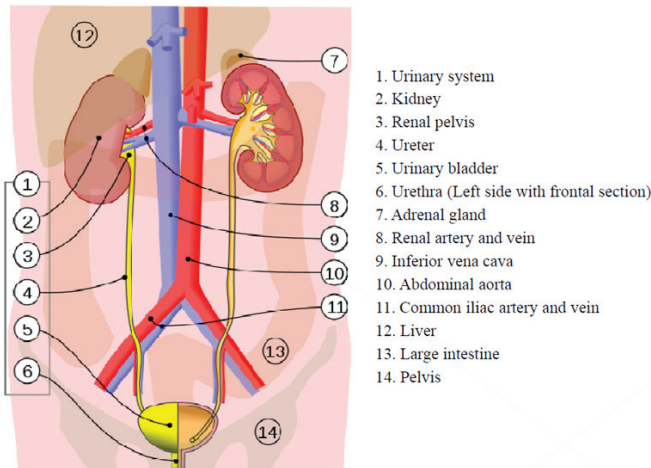
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Urethra

The urethra is a tube for the passage of urine from the bladder to the external environment. The female urethra is about 4cm long and is located posteriorly to the symphysis pubis. The male urethra is about 15 to 20cm in length and passes from the bladder through the prostate gland and through the penis. Due to the difference in length and the proximity to the rectum females are far more likely to develop urinary tract infections than males.

Diagram 3: The urinary system



Normal changes in the gastrointestinal system associated with ageing

As people age the sensations of smell and taste decrease, as does thirst perception. Appetite can be poor as a result of the sensory loss and the older person is at greater risk of malnutrition and dehydration. This risk is further compounded by the fact that oral mucosa atrophies and gums shrink away from the base of the teeth. This can result in pain as sensitive parts of the teeth such as dentine, become exposed. Bone resorption from the jaws occurs and teeth are loosened. There is less saliva and it has a thicker consistency.

Oesophagus and stomach

Oesophageal and gastric motility decreases as people age, so there is delayed entry of food into and delayed emptying from the stomach. There is also an increased risk of choking and aspiration as a result. The gastric mucosa atrophies and there is less hydrochloric acid production (achlorhydria), so the protective function of the gut is diminished as well as the absorption of iron, calcium and B12. Symptoms of B12 deficiency (pernicious anaemia) have a slow onset and can be misdiagnosed since they can look like Alzheimer's disease

or other chronic conditions. Symptoms include extreme fatigue, dementia, confusion, and tingling and weakness in the arms and legs, and if not treated, can result in permanent neurological defects.

Gastric (stomach) ulcers are more common after the age of 60 and can be benign or malignant. They can result from a deficiency in B12, but more commonly are caused by an infestation of *Helicobacter pylori* (*H.pylori*), although ironically this bacterium can also reduce absorption of vitamin B12. Another cause of ulcers, particularly in the older person, is regular use of non-steroidal anti-inflammatory drugs (NSAIDs), such as aspirin or ibuprofen, as they irritate and erode the gastric mucosa. The most common symptom of an ulcer is a burning pain in the abdomen. The pain can last from minutes to hours and often occurs between meals. The pain may be relieved by eating food or taking antacids. Atrophic gastritis is a stomach disorder that is unique to older people and involves the shrinking and inflammation of the inner lining of the stomach; it is associated with an increased risk of stomach cancer. While it can occur as a normal part of the ageing process it is also due to chronic infection by *Helicobacter pylori* (*H. pylori*) or *Campylobacter pylori* (*C. Pylori*). It is usually symptomless.

The liver

The major functional changes to the liver with age include: reduced blood flow; decreased metabolism of drugs and tolerance to alcohol; and a diminished capacity to regenerate damaged liver cells. The half life of some drugs, such as benzodiazepines, may be doubled.

The intestine

Intestinal changes are not obvious, but intestinal function may be diminished due to loss of abdominal musculature that supports peristalsis. As we age the small intestines absorb less calcium. Therefore, we need more calcium to prevent bone mineral loss and osteoporosis in later life. Some dairy intolerance may develop as the body produces less of the enzyme lactase.

The prevalence of diverticular (small outpouches in the colon) disease increases with age. The older person may have no symptoms of diverticula, but if they become inflamed they result in severe abdominal pain. Diverticulitis can be prevented by maintaining a high intake of fibre.





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Nutrition, metabolism and elimination assessment

There is reduced peristalsis of the large intestine and a diminished defaecation sensation with ageing and this can be a major cause of constipation in the older person, which is then compounded by other factors such as a low intake of fibre and water, inactivity, medications, and the overuse of laxatives.

The pancreas

While insulin production continues normally in the older person, other factors place them at greater risk of developing Type 2 diabetes. Muscle cells become less sensitive to insulin, possibly due to fewer receptor sites, and as a result glucose uptake is reduced. Normal fasting blood glucose rises gradually after 50 years of age. Obesity and inactivity also contribute to the development of diabetes (Type 2) in the older person. It is usually managed through diet, exercise, and oral hypoglycaemic medications.

The skin

With ageing, skin becomes thinner and less elastic. There is an inability of the skin to maintain moisture and cells decrease in size and become more fragile. The development of chronic conditions as part of ageing, such as peripheral neuropathy and decreased sensation and circulation, means the older person's skin is more susceptible to pressure ulcers, abrasions and burns. Impaired skin integrity predisposes the older person to infection from organisms that are usually normal skin flora but are now able to enter the person's system. The older person is significantly more likely to develop a life-threatening infection than a younger person.

With ageing the extremities become drier, particularly exposed areas, such as the elbows. Skin may hang loosely from the body frame with loss of adipose tissue and inelasticity. Common skin lesions that are part of normal ageing include the following:

- Cherry angiomas – small, bright red papules that can be round, flat or sometimes raised and may be surrounded by a pale halo. They can be distributed in the trunk and extremities. Their presence is of no significance and there is an increase in size and numbers of cherry angiomas with age
- Spider angiomas – fiery, red star shaped marking with a solid circular centre that can be distributed on the face, neck, arms, upper torso (rarely below the waist). Their presence may be indicative of liver disease or vitamin D deficiency but they may just be normal in some people

- Seborrheic keratoses – pigmented wart-like lesions, usually brown in colour on the face or trunk which are the most common benign growth in the older person. They are found mostly on the trunk and may be due to sun exposure and genetic predisposition
- Cutaneous tags (acrochordons) – small soft tags of skin, usually on the upper body but can also be distributed on the eyelids, cheeks neck and axilla. They form a stalk and are polyp like.

Hair and nails

As we age, the hair follicles produce less melanin which provides pigmentation (colour) for hair. Hair usually starts graying from the temples and extends to the scalp. Hair growth slows, with some follicles ceasing hair production all together. The individual hair strands become smaller, so hair overall appears thinner and finer.

Men may experience baldness as testosterone levels begin to decrease. Women may also experience a form of baldness where the hair becomes so fine and thin all over the head that the scalp can be seen through it. Body hair may follow similar patterns, but at a much slower rate or not at all.

Nails grow slower and become brittle and dull. They may change colour (e.g. yellowing). Nails, particularly toe nails, become thicker and harder and are more likely to become ingrown. Vertical ridges may develop and this is normal, but any ridging, pitting or change in the shape of nails or finger tips should be investigated as it may be associated with nutritional deficiencies and underlying disease.

Impaired immunity

Ageing means a decrease in the normal immune mechanisms. Atrophy of the gut and inflammation of the gastric mucosa means there are decreased physical barriers to prevent bacteria entering the system.

There is decreased immuno-competence as the body is less able to produce antibodies in response to antigens. The thymus gland shrinks with age and one result of this is the reduced production of white blood cells, which are essential to an effective immune system.

The older person, particularly in institutional care, has greater exposure to iatrogenic causes of infection through more frequent invasive medical procedures and increased exposure to sources of nosocomial infection.





Module 4:

Nutrition, metabolism and elimination assessment

The kidney

Kidney function decline begins in our 40s and progressively deteriorates, although adequate function is normally maintained; however, the changes place the older person at higher risk of developing renal failure (acute or chronic). The main reason for the changes is the deterioration of the blood vessels in the kidney and subsequent decrease in blood supply; by the age of 80 it is half what it was at age 40.

The kidneys shrink and lose the ability to filter the blood efficiently, because there are fewer nephrons and glomeruli numbers drop by up to 70% by the age of 80. The metabolism and clearance of some medications will also be affected with an increased risk of toxicity.

The older person is at greater risk of dehydration due to a drop in fluid regulatory hormones, which means the older person has trouble keeping salt in the body and this results in an inability to concentrate urine and eliminate solutes from the body.

The production of aldosterone is decreased in older people with the result that they are at greater risk of orthostatic hypotension, which places them at risk of falls.

As the bladder ages there is a decrease in bladder capacity and urinary flow, with an associated increase in urgency and the amount of urine left in the bladder after micturition (residual volume). These changes contribute to an increase in nocturia (frequent urination at night) as well as a higher rate of urinary tract infections among older people.

Nutrition, metabolism and elimination assessment

Nutrition and metabolism subjective assessment

- The older person's description of their food and fluid consumption
 - Ask the person to describe ALL the food and drink they have had in the last 24 hours. (This is not the best way to assess nutrition and hydration as people forget and it may not provide an accurate picture of their intake over a period of time, but it is a good starting point and can identify areas for further examination. A food diary can be used to capture food and fluid intake over time)
 - Ask questions about the portion size and condiments used with the meal
- Recent alterations
 - Appetite:

- Ask questions about changes in taste and smell. Taste can be tested by using a cotton applicator dipped in salty, sweet or sour solution and then asking the person to identify the flavour. If sensation is altered, ask questions about medications, upper respiratory infections and smoking

– Weight

- How much has been lost or gained in relation to usual weight?
- Has it been sudden or gradual and over what time period?
- What is their energy expenditure/requirements in comparison to food intake; i.e. how active are they and how much do they eat?
- Was the weight loss planned and how did they go about it; e.g. what was their diet plan?
- If the weight loss was unplanned, was it associated with any other symptoms, such as loss of appetite, nausea and vomiting, diarrhoea, abdominal pain, frequent urination or increased thirst?
- If symptoms exist explore the severity, duration, frequency and management of them
- Abdominal pain (see table below) can arise from organs (visceral pain) or from inflammation of the peritoneum (parietal pain) or can be referred from another source
- Are they taking any medications that could affect weight loss (diuretics, antibiotics) or gain (steroids)?
- Are there any increased metabolic demands, such as diabetes, infection, cancer or obvious areas for fluid loss, such as draining wounds, stomas or chronic blood loss?

Nutritional assessment using height and weight

- Calculation of body mass index (BMI)
- Weight (in kg) divided by height (in m²)
- As a rule of thumb, BMI:
 - Should be between 20 and 25 to be considered normal
 - Between 26 and 30 is considered to be overweight
 - Over 30 is considered to be obese





Module 4:

Nutrition, metabolism and elimination assessment

Table 1: Common causes of abdominal pain

Common Cause	Location	Characteristic
Oesophagus – gastrooesophageal reflux disease (GORD)	Retrosternal and upper epigastrum	Occurs after meals, burning pain
Gallbladder – cholecystitis	Right upper quadrant that can radiate to either scapula	Occurs after meals that are particularly fatty or spicy. It is a colicky sudden pain that comes in waves
Pancreas – pancreatitis	Midepigastric pain through to the back or left scapula and flank	It is an acute pain often with severe nausea and vomiting
Stomach – gastric ulcer	Epigastric	Dull, aching, gnawing pain occurs with food and radiates to the back or lower sternum
Kidney – renal calculi	Flank or lower abdominal	Acute severe, cramping, colicky

Chapter 19: Abdomen (2012). In Forbes, H., & Watt, E. (Eds.), *Jarvis's physical examination & health assessment [Australian & New Zealand edition (pp. 499-536)]*. New South Wales: Elsevier Australia.

- Some studies have shown there is a decrease in mortality when an older person's BMI is between 25-29.
 - Condition of hair, skin and nails:
 - Gauge the person's perceptions of their condition in these areas. The normal ranges are outlined as part of the objective examination
 - Healing ability:
 - Ask the person what is their perception of their healing ability
 - Do they have any current wounds that you could look at?
 - Ask them how long it has been present
 - Other problems such as dysphagia (difficulty swallowing) (see neurological assessment)
- The older person's food preferences or requirements
 - Eating patterns:
 - Usual calorie intake
 - Food or diet preference, such as vegetarian
 - Vitamin or other supplements, such as fibre
 - Food allergies or intolerances. If so, what happens; e.g. anaphylaxis or bloating or indigestion or pain?
 - Ability to obtain (such as adequate finances) and prepare foods (in the past, if not currently able)
 - Typical meal-time rituals, such as eat in front of television
 - Dentures or other eating aids, such as modified cutlery
 - Ability to masticate/chew
 - Dental history
- Fluid intake
 - Usual daily intake? Should be a minimum of 1600ml per day
 - When do they take fluid? Do they restrict fluid intake; e.g. after 1700 hours to manage nocturia?
- Nutritional supports
- Nutritional knowledge
 - Knowledge about healthy and unhealthy foods
 - Knowledge about specialised diets, such as diabetic or weight reduction





Module 4:

Nutrition, metabolism and elimination assessment

- Activity/exercise patterns
 - Past relevant medical/surgical history
 - Chronic illness, such as diabetes or hyperthyroidism
 - Surgery to the gastrointestinal tract
 - Diagnosed eating disorder
 - Family history; e.g. obesity, alcoholism or metabolic disorders
 - Medications
 - Identify what may have an effect on nutrition or impact upon the gastrointestinal system; e.g. use of antacids or NSAIDs. Approximately 400 medications can cause a dry mouth; e.g. anti-cholinergics, anti-depressants, anti-histamines, decongestants, diuretics, anti-hypertensives, some bronchodilators, anti-psychotics, anti-parkinsons medications.
 - Potential medication side effects:
 - Nausea & vomiting (antibiotics, digoxin, opiates, theophylline, NSAIDs)
 - Anorexia (antibiotics, digoxin)
 - Decreased sense of taste (calcium channel blockers)
 - Early satiety (anticholinergics)
 - Constipation (opiates, Iron supplements, diuretics)
 - Elimination subjective assessment
 - Any difficulty when voiding?
 - Frequency and amount of urine produced
 - Appearance of urine; e.g. dark (could be bile), clear, straw-coloured, blood (haematuria) and cloudy (infection)
 - Any associated signs or symptoms, such as burning, pain (dysuria) or smell?
 - Any nocturia - particularly with men with enlarged prostates, which usually present as difficulty in initiating voiding (hesitancy) and then an erratic stream that involves straining to maintain the stream. Other signs and symptoms of an enlarged prostate are decreased force of the stream, dribbling, a feeling of incomplete emptying of the bladder and a history of urinary tract infections
 - Any problems with voluntarily 'holding on' or 'wetting pants'?
 - Are they able to take themselves to the toilet?
 - What is the loss of control associated with? For example, sneezing or coughing, exercise or bearing down
 - What do they do to manage urinary incontinence?
- Incontinence may be due to neurological disease that results in loss of control, but it may also be as a result of weakened musculature in the pelvic floor (stress incontinence) or as a result of infection (urgency incontinence). Functional incontinence is common in older people and results from the inability to get to the toilet on time, because of cognitive problems, such as dementia or confusion, poor eyesight or mobility.
- Bowel habits
 - Frequency
 - What is the colour and consistency; e.g. black tarry stools (melaena) indicate blood loss from the upper gastrointestinal system and bright red blood (frank blood) indicates bleeding in the lower gastrointestinal system
 - Any changes to normal bowel pattern, such as diarrhoea or constipation?
 - Use of laxatives or other aperients





Module 4:

Nutrition, metabolism and elimination assessment

Objective areas for assessment

Preparation	
Equipment	<ul style="list-style-type: none"> – Pen torch – Tongue depressor – Stethoscope – Watch – Gloves – Tape measure
Environment	<ul style="list-style-type: none"> – Quiet surroundings – Good lighting – Bed at appropriate height – eye to eye – Remove clutter
Older person	<ul style="list-style-type: none"> – Privacy and comfort – Sitting upright and then moving to lying on back – Information and consent – Empty the bladder prior to examination – Provide a urine specimen if needed
Clinician	<ul style="list-style-type: none"> – Anatomy and physiology, anatomical landmarks – Normal ranges for findings – Sequencing of assessment, head to toe – Documentation – Wash your hands – Warm your hands and equipment

Skin examination

Inspection and palpation

Temperature

- Normal findings:
 - Warm, dry and symmetrically uniform colouration (depending upon a person’s ethnicity)
 - Note discolourations, growths and tags on skin surface (see common changes with ageing)
 - Hair is evenly distributed, particularly the lower limbs, where sparse and uneven hair distribution indicates poor tissue circulation and nutrition
 - In the older person skin appears thinner and veins and skin pigmentations are more obvious
 - Skin appears loose due to loss of skin elasticity and loss of underlying adipose tissue.

- Turgour, testing the ability of the skin by gently pinching it (tenting) and timing its return to normal shape (within < 1 second) as a measure of hydration, is not as reliable in the older person because of the loss of skin elasticity. If you are going to test using this method use an area such as the chest that has had less exposure.

Risk of decubitus ulcers (pressure sores) can be assessed using the Braden scale.





Module 4:

Nutrition, metabolism and elimination assessment

The Braden scale is a scale made up of six subscales that identify the sources that contribute to the risk of skin breakdown:

- Sensory perception
- Moisture
- Activity
- Mobility
- Friction
- Shear forces.

Waterlow and Norton are examples of other scales that can be used to assess the skin.

Skin breakdown occurs either as a result of higher intensity and duration of pressure, or lower tissue tolerance for pressure. Each category is scored between 1 and 4, with each score accompanied by a descriptor. The lower the score, the greater the risk. Cut-off points have been identified as 15–18 (at risk), 13–14 (moderate risk), 10–12 (high risk) and below 9 (very high risk). The score will determine the type of intervention required. Nutritional assessment is always part of the planning for preventing (and treating) pressure ulcers.

Hair and scalp

- Nutritional deficits can cause changes to healthy hair and are evidenced by hair loss (alopecia), loss of tensile strength (loss of elasticity; hair breaks easily when stretched) and general poor condition.
- Dehydration can cause a dry and flaky scalp.

Nails

(Are also discussed in the Cardiac, Respiratory and General Assessment Modules)

- Nutritional deficits
 - Vitamins A, B, D and calcium deficiencies cause dry and brittle nails with horizontal or vertical ridges
 - B12 deficiency result in spoon-shaped nails with upward curved ends and a darkened colour
 - Pale, flat, brittle nails are found with iron deficiency and endocrine disorders
 - Pitting of the nails can indicate psoriasis
 - Discoloration can be a sign of disease, but may also be due to behavioural or occupational factors; e.g. yellowing of the nail can be a sign of liver disease and heavy smoking. The location of the discoloration gives a clue to what the likely source is. Liver disease manifests in the nail and nail bed, whereas discoloration from smoking is also on the skin of the fingers.

Oral examination

Oral examination is essential in the older person as poor oral health is prevalent and a major source of discomfort and loss of quality of life for older people. The presence of poor oral health also places the older person at significant risk of developing other health problems, many of which are life-threatening.

Common problems:

- Dental caries
- Dry mouth (xerostomia)
- Periodontal disease
- Tooth wear
- Oral cancer
- Malnutrition.

Poor oral health leads to problems with chewing and eating, and is a major contributor to the development of malnutrition as the older person avoids eating foods, such as meat, because it cause pain or because they are unable to chew. Chronic inflammation (stomatitis) may result from ill-fitting dentures and causes pain. Xerostomia is unpleasant in itself, but also means that taste is altered and the ability to properly masticate food for swallowing is affected due to the lack of saliva. Xerostomia is a side effect of many common medications used by the older person, such as antihypertensives, decongestants, antidepressants and diuretics.

Poor oral hygiene poses considerable risk of the development of respiratory infection, cardiac disease and stroke.

Oral examination has also been discussed in other system assessment modules – neurological and cardiac. The focus in this module is on information relevant for gastrointestinal functioning:

- Inspect external mouth
- Note any mouth odour
- Palpate temporomandibular joint
- Check alignment of top and bottom jaw when biting down and chewing
- Inspect the lips and buccal oral mucosa – colour, lesions/ulcers, nodules, moisture
- Inspect the dorsal, lateral and ventral tongue surfaces





Module 4:

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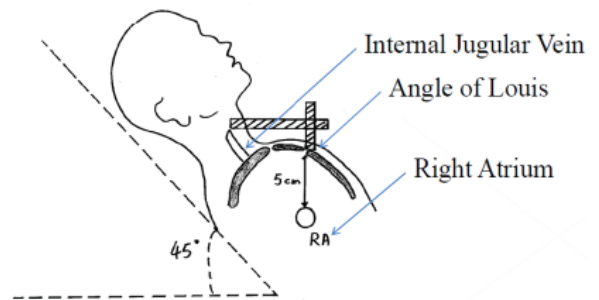
- Test the function of cranial nerves XII (hypoglossal) and X (vagus)
- Inspect the oropharynx
- Inspect the posterior tongue
- Check the uvula and test the function of cranial nerve IX (glossopharyngeal) (gag reflex) by touching the posterior wall with a tongue depressor
- Inspect hard and soft palates
- Check the teeth and gums, specifically:
 - Dentures and the fit of the dentures
 - The condition, presence/absence and looseness of the teeth
 - The gums for colour, swelling, ulceration, retraction of margins and bleeding
- Check the tonsils
 - If present, evaluate person's ability to swallow
- When conducting an oral examination begin anteriorly and move posteriorly, using a penlight:
 - Teeth should normally be white, straight and evenly spaced
 - A dry mouth and furrowed tongue can be indicative of dehydration
 - Ask the person to put out their tongue and inspect for symmetry. Asymmetric protrusion of the tongue suggests involvement of Cranial Nerve X11 (Hypoglossal)
 - Saying 'ah' or yawning should cause the soft plate & uvula to rise. This is a test of Cranial Nerve X (vagus). In Cranial Nerve X paralysis soft palate does not rise and uvula deviates to the opposite side
 - Gag reflex should be elicited by touching the posterior wall with a tongue depressor.

Jugular venous pressure

The jugular venous pressure (JVP) (reflects the pressure in the right atrium). An elevated JVP can mean heart failure and circulatory overload; a sunken, weak JVP can reflect decreased circulatory volume and possibly dehydration).

- Technique
 - Position person in a 45° lying position
 - Turn head to the left and sink chin onto pillow
 - Look above the right clavicle for the pulsation of the right internal jugular vein
 - The height of the JVP is measured as the distance between the highest point of the pulsation and a horizontal line drawn from the upper level of pulsation to a point vertically above the Angle of Louis
 - The vertical height should be less than 4cm.

Diagrams 4: Measurement of jugular venous pressure



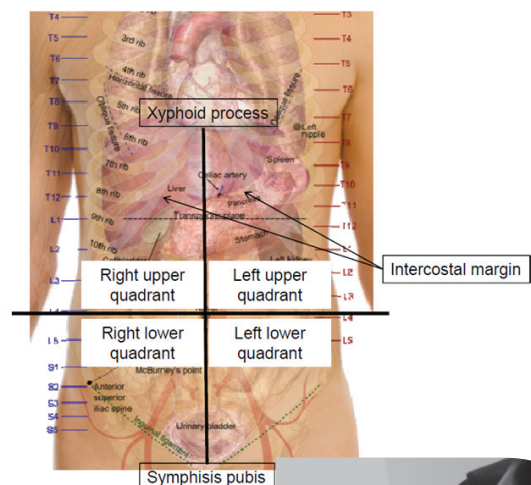
Focused abdominal assessment

Abdominal landmarks

The abdomen can be divided into four quadrants or nine sections (the quadrants are the easiest). The names of the different quadrants are used to describe the locations of the underlying organs and structures.

The upper limit of the abdominal landmarks is the right and left costal margin and the xypoid process. The lower limit of the abdominal landmarks is the right and left anterior superior iliac spine (ASIS) and the symphysis pubis. The umbilicus is midline.

Diagrams 5 & 6: Abdominal quadrants and regions including abdominal landmarks



The four quadrants are the:

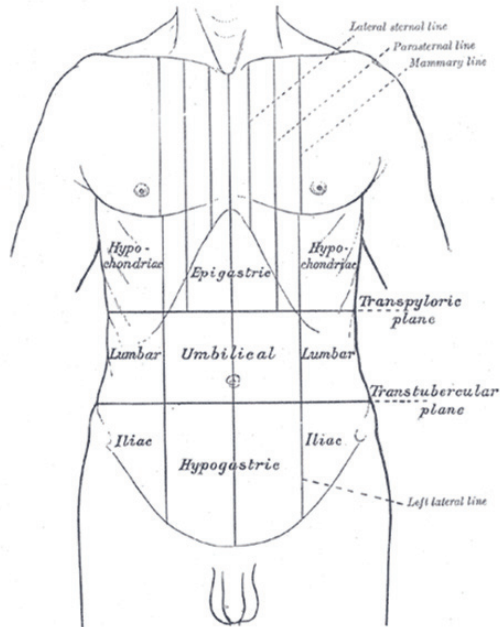
- Left and right upper quadrant
- Left and right lower quadrant.





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The nine abdominal regions are the:

- Left and right hypochondria
- Epigastrum
- Left and right lumbar region
- Umbilicus
- Left and right iliac region
- Hypogastrum.

Sequence of examination

Note that for abdominal assessment the sequence of examination changes so that peristaltic sounds are not altered by palpation and percussion:

- Inspection
- Auscultation
- Percussion
- Palpation.

Position the older person lying flat on their back with knees slightly bent and a flat pillow under their head. Their arms should be beside them or on their chest. The aim is to relax the abdomen as muscle tightening can mask signs. Having arms above their head or their neck flexed tightens abdominal muscles. Observe the person's face as you move through palpation and percussion for signs of pain.

Expose the abdomen from the lower rib cage to the hips.

Objective assessment adaptation for the older person

The approach is similar to assessment of the younger person. The real adaptation is to accommodate the older person's comfort during position changes and longer periods of lying flat. The abdominal contour may be more rounded in the older person and there may be more adipose tissue. Palpation may in fact be easier because there is decreased muscle.

Organs that normally sit partially under the ribs may be displaced downwards in the presence of conditions such as hyperinflation of the lungs. The organ size should not be affected by this.

Older people are particularly susceptible to intestinal disorders, with constipation a very common complaint and faecal impaction an extreme version of this; as a result dullness may be heard over an area where you would expect tympany. Fluid and electrolyte imbalances that slow smooth muscle motility, such as hyperkalemia, may predispose the older person to intestinal obstruction, so bowel sounds may be slower. Cancers of the stomach and intestine are more common in the older age group.

Inspection of the abdomen

Technique – Initially stand beside the person and look down on the abdomen and then squat down with your eyes just a little higher than the abdomen. You are observing the:

- Contour
 - This is the shape or profile of the abdomen extending from the costal margins to the symphysis pubis when viewed from the side. It can give an indication of the person's nutritional state and may also indicate some disease conditions, such as liver failure
 - Contour can be described as flat, rounded (convex) or scaphoid (concave)
 - Move to the foot of the bed and observe the contour from there
 - Ask the person to increase intra-abdominal pressure by taking a big breath and holding it. Ask them to lift their head from the pillow and then drop their chin to their chest. The person can also cough. The contour of the abdomen should remain the same with these actions





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- Abdominal distension – 6 ‘Fs’ + 1:
 - Fat
 - Fluid
 - Faeces
 - Flatulence
 - Foetus
 - Fibroids
 - Fatal tumours
- Movement
 - Men commonly breathe abdominally so there is movement of the abdomen with respiration. This is less likely to happen with women
 - Aortic pulsations are normally visible in thin people, but can be seen in other circumstances and may indicate increased pressure in the aorta or an aneurysm
 - Peristaltic movement across the abdominal surface is not normally visible
- Umbilicus
 - Inverted or everted
 - Bluish peri-umbilical colour may be an indication of intraperitoneal haemorrhage
- Symmetry

Technique – from your position beside the person shine your pen torch across the abdomen (tangential lighting) which casts shadows with any lumps or bumps:

 - The umbilicus should be roughly central on the abdomen
 - The skin and musculature of the abdomen should be symmetrical around the umbilicus
 - Note any striae, pigmentation, scars or vascularity. Veins (scattered fine veins may be normal; dilated superficial capillaries with no pattern may be seen on older people. Dilated veins may also indicate liver involvement). Striae which are old, silvery, white, from past pregnancies or weight gain are normal, whereas may be abnormal with ascites or bluish/purple colouration with Cushing’s syndrome
 - Note any asymmetry, lumps or bulges.

Waist circumference is measured by putting a tape measure around the waist (on the skin) half-way between the lowest rib and the top of the iliac crest.

For men:

- 94 cm – no increased obesity related health risk
- > 100 cm – moderately increased cancer risk (kidney & rectum); significantly increased risk (oesophagus, colon, aggressive prostate cancer, myeloid leukaemia); increased risk of diabetes.

For women:

- < 80 cm – no increased obesity-related health risk
- > 85 cm – moderately increased cancer risk (kidney, breast, colon & rectum); significantly increased cancer risk (oesophagus, uterus, myeloid leukaemia); increased risk of diabetes.

Auscultation of the abdominal regions

Technique – use the diaphragm of the stethoscope. Make sure it is warm so it does not to cause muscle tensing.

- Start in the right lower quadrant, although you can start in any quadrant and move through the four quadrants listening at each spot for bowel sounds; that is, evidence of peristalsis. Hold the stethoscope in place for about 1 or 2 minutes depending on the presence and frequency of bowel sounds.
- Normal finding is about 5 to 30 bowel sounds per minute. They are normally irregular in rhythm and sound high-pitched and gurgling. Hyperactive bowel sounds (borborygmus) may indicate early obstruction as peristalsis speeds up to try and move the obstruction and are usually loud, high-pitched, rushing, tinkling sounds. If there is an obstruction you would normally hear them above the obstruction, whereas below the obstruction there may be no bowel sounds. If bowel sounds are absent make sure you listen in the region for at least five minutes to confirm the absence. A common cause of a silent abdomen is a paralytic ileus after surgery.





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Percussion of the abdomen

(Refer to the General Assessment Module for the percussion techniques)

Usually indirect percussion is used for abdominal assessment.

- Percussion of the abdomen is used to:
 - Assess the location and size of organs and the presence of gas and fluid
 - Determine the density of underlying structures
 - Determine presence of a mass
 - Detect the presence of pain if an underlying organ is inflamed.
- Tympany is the predominant sound over the abdomen; that is, because there is air in the stomach and intestines.
- Dullness is heard over bone and solid organ.

Technique – percuss in all 4 quadrants to get a general sense of things and then return to areas where you heard something you didn't expect. Be systematic and cover several areas within an abdominal region. You need to keep in mind the purpose for your assessment and what you plan to do with the information; that is, to plan care within your scope of practice. For example, a nurse may percuss the margins of organs to gauge where they are and to determine any abnormalities, but it is not within a nurse's scope of practice to diagnose and treat an enlarged liver. The nursing focus is to intervene in the problems that arise as a result of the illness for a person's ability to be self-caring. On the other hand, a doctor would want to determine the size of the liver as part of diagnosing and treating liver disease.

Palpation of the abdomen

The purpose of palpation of the abdomen is to determine organ size and detect areas of spasm, tension and tenderness.

Technique – light and deep palpation can be used over the abdomen. Once again, think about the intended use of data you are collecting as this will guide whether you do both types of palpation. For example, most nurses in general care would not perform deep palpation.

Move systematically over the abdomen and apply light and deep palpation at each spot. Normally the abdomen should be soft and relaxed. Observe the person's face for indications of discomfort. Note temperature and diaphoresis. Your subjective assessment should have identified areas where pain may be located and you should leave these until last so you don't set up muscle tightening (guarding) in response to pain.

Percussion and palpation can also assist in determining the cause of enlargement of the abdomen. For example, if the bloating is due to gas then the abdomen will feel tight over the whole surface and sound hyperresonant. If the abdominal enlargement is due to fluid, such as with ascites (as a result of liver failure or blockage), the fluid will sink to the lowest point (i.e. the flanks) so they will bulge, and the gas will rise, so palpation would feel different depending on the underlying constituent, and percussion would elicit tympany at the umbilicus or peak of the abdomen, but this sound would change to dullness as you moved to areas with fluid.

Bladder assessment

Generally the bladder is not palpable. The area can be percussed.

You would only examine if a person complained of discomfort or difficulty voiding, being careful not to cause further discomfort.

Technique

- Start at the umbilicus and percuss down the midline toward the symphysis pubis

Tympany should be heard until you reach the symphysis pubis but if the bladder is distended then a change to dullness will most likely be heard.

Assessment of constipation

Functional assessment

Factors that mean an older person is at risk of constipation:

- Reduced mobility
- Reduced dexterity
- Communication difficulties
- Poor vision – unable to get to toilets
- Cognitive impairment
- Access to assistance – availability of staff to help
- Unsuitable environment – hard to find or access toilets; ease of use of toilets, such as rails; a lack of privacy when defaecating.

Faecal and urinary incontinence is more common in the older person. Many of the reasons for incontinence are reversible and therefore it is important to diagnose it as early as possible.





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Faecal incontinence occurs as a result of faecal impaction, underlying disease and neurogenic disorders:

- Faecal impaction is in effect an overflow of faecal material around the impaction. People who are at risk of impaction are typically immobile with poor fluid and dietary fibre intake. They may also have a history of chronic laxative use
- Diverticulitis, cancer, inflammatory bowel disease are some of the conditions that may present with faecal impaction
- Neurogenic conditions that decrease the person's ability to recognise the need for defaecation, predispose older people to faecal impaction.

There are two parts to the objective assessment of constipation or impaction:

1. Abdominal examination

- Palpation of the abdomen in the lower right and left quadrant may find hard masses in the ascending, descending and sigmoid colon.

2. Rectal examination

Technique

- Equipment:
 - Disposable gloves
 - Water-soluble lubricant
 - Wipes/tissues
 - Easy access to a toilet.
- Explain the procedure to the person
- Ask them if they wish to use the toilet prior to undertaking the procedure
- Ensure privacy and offer assistance in undressing and positioning for examination where necessary in preparation for procedure
- Position the person in the left lateral position with knees flexed
- Protect the bed with a disposable underpad
- Wash hands with soap and water and put on disposable gloves
- Observe and examine the anal/perianal area
- Lubricate gloved index finger
- Inform the person that you are about to perform the procedure, then insert the finger slowly into the anus then on into the rectum
 - Undertake assessment of:
 - Neurological tone – tone and sensation of the anal sphincter

- Hard rectal mass – presence of faecal matter, amount and consistency. The clinician can use a tool such as the Bristol Stool Chart to compare with their assessment findings
- Slowly withdraw the finger from the patient's rectum when assessment completed. Observe for blood on glove

- Wipe residual lubricating gel from the anal area
- Remove glove, dispose of equipment and wash hands
- Make the person comfortable and offer the toilet or bed pan as appropriate
- Record outcome of examination by documenting:
 - Findings on examination
 - Nursing intervention and outcome
 - Referral to doctor (where indicated).

Other sources for data collection involved with nutrition, metabolism and elimination.

Blood glucose testing

Purpose:

- As a screening measure
- To monitor blood glucose levels (BGLs) of people who are at risk of hyper/hypoglycaemia
- To monitor the effectiveness of insulin therapy.

Testing for undiagnosed Type 2 diabetes is recommended for the following high-risk individuals:

- People with impaired glucose tolerance or impaired fasting glucose
- Aboriginal and Torres Strait Islanders aged 35 and over
- Pacific Islander people, people from the Indian subcontinent or of Chinese origin aged 35 and over
- People aged 45 and over who have either or both of the following risk factors:
 - Obesity (BMI 30 +)
 - Hypertension
- All people with clinical cardiovascular disease (myocardial infarction, angina or stroke).





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Individuals presenting the following risk factors are also considered to be at high risk of having undiagnosed Type 2 diabetes:

- Women with previous gestational diabetes
- People aged 55 and over
- People aged 45 and over who have a first degree relative with Type 2 diabetes.

(National evidence-based guidelines for the detection of Type 2 diabetes mellitus – NHMRC, 2004)

Blood glucose testing technique

- Use of blood glucose monitors is NOT recommended for screening of people at high risk (they should have plasma BGL done in a laboratory).
- Interpretation of findings – ‘normal’ levels:
 - 4.0 – 6.0 mmol/l before meals
 - 4.0 – 8.0 mmol/l two hours after meals, 5–10 mmol is safer range for the elderly due to risk of hypoglycaemia
 - Any random level over 5.5 mmol/l requires further investigation.

Urinalysis

(Performed with test strips)

Often done on admission for baseline and then ongoing as needed.

Main things to remember:

- Use a fresh sample
- Read the result at the time specified on the bottle
- Put the lid back on the bottle as exposure to air decreases the accuracy of the sticks
- Don't have too much urine on the stick.

Normal ranges and associated pathology:

- pH (5–7) – average pH is 6.0. Urine is slightly acidic. An acidic urine helps prevent urinary tract infection (UTI). An alkaline urine occurs with bacteria, such as proteus, and you would expect to also find the urine positive to protein
- Protein < 0.1 g/day – not normally detectable, evidence of renal damage. In a UTI it is around a + not usually higher
- Leucocytes (white blood cells) – not usually detectable; can indicate infection, but need to be aware of the person's haematological status (i.e. not neutropenic)
- Glucose – not normally detectable, evidence of diabetes

- Ketones – not normally detectable, evidence of diabetes; ketones are a by-product of fat metabolism that occurs in the absence of glucose and protein for normal metabolism
- Blood – not normally detectable; abnormal – infection, trauma, renal disease
- Specific gravity (1.010 – 1.025) – concentration of particles in urine. A high specific gravity is found with dehydration due to decreased blood flow which leads to increase secretion of ADH (anti-diuretic hormone) and increased concentration of urine. A low specific gravity occurs with over-hydration when the urine is more dilute. The ability to concentrate urine is decreased in the older person, so may just be a consequence of ageing
- Bilirubin – should not be detected in urine; it may indicate excessive red blood cell destruction or liver disease or biliary obstruction
- Nitrite – not normally detectable; nitrites are a by product of gram –ve bacilli (such as e.coli) activity that cause a urinary tract infection. Testing for nitrite is best done on concentrated urine, so the person should not have voided for at least an hour. Blood, white blood cells and probably protein would be detectable as well if a urinary tract infection.

Assessment for malnutrition

General appearance:

- An emaciated appearance or being underweight; e.g. a BMI <18
- Vital signs for fever.

Mouth assessment:

- Dry, cracked lips
- Bright red oral mucosa
- Tongue may be very red and swollen (glossitis)
- Angle stomatitis
- Thrush
- Gums may be reddened, swollen and receding.

Muscle:

- Loss of tone and strength – flaccidity and weakness
- Fatigue.

Eyes:

- Vision may decrease due to inflammation
- Appear red and dry.





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Skin:

- Dry
- Increase in looseness and wrinkling as adipose tissue is lost
- Poor colouring, such as white nail beds
- Delayed wound healing.

Cognitive:

- Development of, or increase in, confusion
- Lack of concentration
- Decrease in memory ability
- Irritability
- Poor motor coordination.

Biochemistry:

- Low serum albumin
- Low white blood cells (leucopenia).

Assessment for dehydration

General appearance:

- Sunken eyes
- Vital signs:
 - Tachycardia
 - Orthostatic hypotension
 - Fever
 - JVP low < 2 cm.
- Acute weight loss
- Fluid Balance charting shows greater output than input
- Dry mucous membranes
- Bright red oral mucosa
- Tongue may be very red and swollen (glossitis)
- Angular stomatitis
- Thrush
- Gums may be reddened, swollen and receding.

Muscle:

- Weakness
- Fatigue.

Eyes:

- Sunken.

Skin:

- Tenting of skin on the forehead or sternum not the hand or arm.

Elimination:

- Decreased urine output < 30ml an hour
- Urine dark
- Specific gravity high.

Cognitive:

- Development of or increase in confusion
- Lack of concentration
- Irritability
- Dizziness.

Biochemistry:

- May be elevations in urea, nitrogen, electrolytes and haemoglobin.

Example of assessment documentation for constipation

(Common findings are used)

Report on older person:

- Change in normal bowel pattern and action
- Straining, difficulty passing stool, may have pain.

Documentation – bowel chart:

- Inspection
- Stool – dry, hard
- Abdomen – bloating
- Abdomen – auscultation – decreased bowel sounds
- Percussion – tympany generally, but may be dullness or flatness over an area where you would expect to hear tympany
- Palpation – light – may feel mass of retained stool where would not expect; that is, over lower left abdominal quadrant.





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Assessment for urinary tract infection

(Common findings are used)

Report on older person:

- Dysuria (pain)
- Burning
- Frequency, with small amounts
- Urgency
- Haematuria
- Chills
- Nausea and vomiting (depends on severity)
- Malaise

Inspection

- Inspect urine for colour, clarity – cloudy urine suggests particles indicative of infection
- Test urine (urinalysis) for protein, nitrates, blood, leucocytes
- Collect midstream urine specimen (MSU) and send to pathology
- Blood specimen for full blood count (FBC) – may show decrease in white blood cells (leucocytes)
- Assess vital signs – may show increase in temperature and tachycardia but may not in the older person due to poor thermoregulation and medications such as beta blockers.

Example of assessment documentation for pressure area ulcer

(Common findings are used)

- Report of discomfort (pain or itching) in particular location; altered sensation
- Past history
- Stroke that limits self-movement
- Type 2 diabetes
- Nutritional history
- Difficulty swallowing
- Decreased appetite
- Documentation – Braden scale.

Inspection

- Skin
- Colour – redness over a bony prominence
- Taut, shiny.

Palpation

- Temperature – initially warm compared to surrounding skin, then becomes cooler as ischaemia and necrosis occur
- Area may or may not blanch depending on extent and stage of pressure damage
- Texture/consistency – soft, boggy, indurated
- Integrity of skin – intact or broken; if intact describe appearance. Smell may be relevant if infection of ulcer
- Decreased skin turgour.





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