Thyroidectomy: post-operative care and common complications

**Summary**

Any surgical procedure involves risks. Thyroid surgery can cause potentially fatal complications during the early post-operative phase. It is essential that nurses have the knowledge and skills to detect early signs and symptoms of potential complications and take appropriate action. Early detection and rapid response are key to maintaining patient safety and minimising harm.

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**Keywords**

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**Aims and intended learning outcomes**

The aim of this article is to increase nurses’ knowledge of the anatomy, physiology and pathophysiology of the thyroid gland. Management of the most common post-operative complications associated with the surgical treatment of thyroid disorders is discussed. After reading this article and completing the time out activities you should be able to:

- Identify the most common thyroid diseases that may require surgical treatment.
- Discuss the complexity of surgical procedures involving the thyroid gland.
- Describe the most common post-operative complications associated with surgical treatment of patients with thyroid disorders.
- Identify early signs and symptoms of common complications following thyroid surgery.
- Describe the role of the nurse in the post-operative care of the patient following a thyroidectomy.

**Introduction**

Thyroid hormones are responsible for many important metabolic functions in human physiology. They increase the basal metabolic rate, affect protein synthesis, help to regulate long bone growth and promote neuronal maturation (Table 1). Patients with altered thyroid functioning may require surgical intervention. Thyroidectomy or those procedures involving the removal of a part of the thyroid gland, although relatively straightforward, may be associated with serious complications. This article reviews the anatomy and physiology of the thyroid gland, as well as describing the surgical procedures and common complications.

**Anatomy and physiology**

The thyroid gland is one of the largest endocrine glands in the body, weighing approximately 20g
learning zone surgical nursing

(Seeley et al 2007), and is larger in females. It is composed of two lobes connected by a narrow band of thyroid tissue called the isthmus (Kirsten 2000) (Figure 1). The lobes are lateral to the upper portion of the trachea and inferior to the larynx. The isthmus extends across the anterior aspect of the trachea – the thyroid gland extends from the level of the fifth cervical vertebra to the first thoracic vertebra (Shaheen 2003). It is surrounded by the perithyroid sheath and is attached to the cricoid cartilage by the ligament of Berry (De Felice and Di Lauro 2004). The thyroid gland contains numerous follicles, which are small spheres, with walls composed of a single layer of cuboidal epithelial cells. The centre, or lumen, of each thyroid follicle is filled with a protein called thyroglobulin to which thyroid hormones are bound. The follicles store large amounts of thyroid hormones (Genuth 2004).

The thyroid gland has a rich blood supply (Skandalakis 2004). The arterial supply is bilateral from the external carotid arteries, flowing through the superior thyroid artery, and the subclavian system, through the inferior thyroid branch of the thyrocervical trunk (Toni et al 2003). Venous drainage is established by three main pathways: the superior, middle and inferior thyroid veins (Guyton and Hall 2006). The thyroid gland is innervated by the sympathetic and parasympathetic divisions of the autonomic nervous system (Sherman and Colborn 2003). The external laryngeal nerve is a division of the superior laryngeal nerve, a branch of the vagus nerve, supplying the cricothyroid muscle (Page et al 2003). Since this muscle is involved in the movements of the vocal apparatus, damage to the nerve will impair phonation (Skandalakis 2004). Another important nervous structure is the recurrent or inferior laryngeal nerve, also a branch of the vagus; this nervous structure enters the pharynx below the inferior constrictor muscle to innervate the intrinsic muscles of the larynx, playing a major role in controlling the movements of the vocal cords (Sherman and Colborn 2003).

The parathyroid glands lie on either side of the thyroid (Kuriloff and Sanborn 2004). Parathyroid hormone, along with vitamin D, regulates calcium and phosphorus concentrations in the body (Udelsman and Donovan 2004). The thyroid gland produces two related hormones: thyroxine (T4) and triiodothyronine (T3). These hormones have a critical role in cell differentiation during development, and

<table>
<thead>
<tr>
<th>Target tissue</th>
<th>Effect</th>
<th>Mechanism</th>
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<tbody>
<tr>
<td>Heart</td>
<td>Chronotropic (affecting the rate of the heart beat).</td>
<td>Increase the number and affinity of beta-adrenergic receptors.</td>
</tr>
<tr>
<td></td>
<td>Inotropic (affecting the force or energy of muscular contractions).</td>
<td>Enhance responses to circulating catecholamines and affect the proportions of cardiac proteins.</td>
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<tr>
<td>Adipose tissue</td>
<td>Catabolic.</td>
<td>Stimulate lipolysis.</td>
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<tr>
<td>Muscle</td>
<td>Catabolic.</td>
<td>Increase protein breakdown.</td>
</tr>
<tr>
<td>Bone</td>
<td>Developmental and metabolic.</td>
<td>Promote normal growth and skeletal development, accelerate bone turnover.</td>
</tr>
<tr>
<td>Nervous system</td>
<td>Developmental.</td>
<td>Promote normal brain development.</td>
</tr>
<tr>
<td>Gut</td>
<td>Metabolic.</td>
<td>Increase the rate of carbohydrate absorption.</td>
</tr>
<tr>
<td>Lipoprotein</td>
<td>Metabolic.</td>
<td>Stimulate formation of low-density lipoprotein receptors (increased thyroid hormone levels stimulate fat mobilisation, leading to increased concentrations of fatty acids in plasma. They also enhance oxidation of fatty acids in many tissues. Plasma concentrations of cholesterol and triglycerides are inversely correlated with thyroid hormone levels).</td>
</tr>
<tr>
<td>Other</td>
<td>Calorigenic.</td>
<td>Stimulate oxygen consumption by metabolically active tissues (exceptions include adult brain, testes, uterus, lymph nodes, spleen and anterior pituitary). Increase metabolic rate.</td>
</tr>
</tbody>
</table>

(Jameson and Weetman 2008)
help maintain thermogenic and metabolic homeostasis in adults (Larsen et al 2008). T4 is produced only in the thyroid gland, whereas about 80% of T3 is derived from the conversion of T4 to T3 in the peripheral tissues, including adipose tissue, endothelial or epithelial tissue, and muscular and nervous tissue. The remaining 20% of T3 comes from the thyroid gland (Genuth 2004). Thyroid hormone synthesis depends on an adequate intake of dietary iodine (John and Sieber 2008).

Thyroid-stimulating hormone (TSH), produced in the anterior lobe of the pituitary gland, must be present to maintain thyroid hormone synthesis and secretion. TSH causes an increase in synthesis of thyroid hormones, which are then stored in the thyroid follicles and attached to thyroglobulin (Dillmann 2004). Thyrotropin-releasing hormone (TRH), produced in the hypothalamus, works with TSH to increase T3 and T4 secretion in the thyroid gland. When TRH increases, TSH secretion also increases (Kondo et al 2006). The thyroid hormones have a negative feedback effect on the hypothalamus and anterior pituitary gland: as T3 and T4 increase in the circulatory system, they inhibit TRH and TSH secretion (John and Sieber 2008).

Thyroid hormones enter the systemic circulation bound to plasma proteins (John and Sieber 2008). Only small amounts of T4 and T3 circulate in their biologically active free form. This helps to maintain adequate levels in the body by exerting negative feedback on the hypothalamus and pituitary gland (Larsen et al 2008). Even small changes in biologically active free hormone concentrations result in immediate changes in TSH secretion, making this hormone a reliable indicator of thyroid function (Dillmann 2004).

**Laboratory assessment**

There are a variety of diagnostic tests that can be performed to assess thyroid function. However, no single test can be relied on exclusively. The high sensitivity and specificity of TSH assays has improved laboratory assessment and evaluation of thyroid function. This is because TSH levels change dynamically, responding to alterations in T3 and T4. Therefore, thyroid function testing should assess whether TSH levels are suppressed, normal or elevated. In general, a normal TSH excludes a primary abnormality (that which occurs in the organ itself) of thyroid function (Amato et al 2006).

If an abnormal TSH level is found, measurement of circulating thyroid hormone levels to confirm diagnosis of hyperthyroidism (suppressed TSH) or hypothyroidism (elevated TSH) must be performed (Jameson and Weetman 2008). T3 and T4 are highly protein-bound, and a variety of factors, for example illness, medications or genetics, can influence protein binding. It is useful, therefore, to measure the free hormone levels, which correspond to the biologically available hormone pool (Davies and Larsen 2008). Reference values for normal thyroid function are shown in Table 2.

Total thyroid hormone levels are high when thyroxine-binding globulin is increased as a result of oestrogens (pregnancy, oral contraceptives, hormone therapy, tamoxifen) and decreased when thyroxine-binding globulin is reduced (androgens, nephrotic syndrome). Genetic disorders and acute illness can also cause abnormalities in thyroid hormone binding proteins, as well as a vast number of drugs, for example phenytoin, carbamazepine, salicylates and non-steroidal anti-inflammatory drugs (Lal and Clark 2010).

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**FIGURE 1**

Anatomy of the thyroid gland

- **Carotid artery**
- **Larynx**
- **Right lobe**
- **Left lobe**
- **Isthmus**
- **Trachea**

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A patient is admitted to the emergency department at your hospital with tachycardia, tremor and palpitations, in addition to continued weight loss over the past six months. An initial physical examination reveals asymmetry in the right anterior cervical region and blood tests highlight increased serum levels of free T3 and T4 hormones. Make a list of the associated signs and symptoms and compare your answers with the following text.

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**NURSING STANDARD**
The pathophysiology of the thyroid gland has been studied intensively (Weitzel 2008). Thyroid dysfunction may occur for a number of reasons and may result in thyroidectomy.

**Hyperthyroidism** Thyrotoxicosis is a hypermetabolic state caused by abnormally high circulating levels of free T₃ and T₄. It is generally caused by hyperfunction of the thyroid gland and is commonly referred to as hyperthyroidism (Hanks and Salomone 2008). The clinical manifestations of hyperthyroidism are inconsistent and include changes related to a hypermetabolic state induced by excessive amounts of thyroid hormones, as well as those related to sympathicotonia, a condition characterised by hyperstimulation of the sympathetic nervous system (Davies and Larsen 2008) (Table 3).

Treatment of hyperthyroidism may include non-invasive techniques such as radioactive iodine to slow hormonal production, or anti-thyroid drugs to prevent thyroid hormone synthesis. When this approach fails or is ineffective, partial or total removal of the thyroid gland will be considered (Lal and Clark 2010).

**Graves’ disease** This disease is characterised by a triad of manifestations, including thyrotoxicosis, infiltrative ophthalmopathy and infiltrative dermopathy. Graves’ disease is common in people aged 20-40 years, with women seven times more likely to have the disease than men. Its aetiology is thought to be autoimmune. The clinical manifestations of Graves’ disease include those that are common to all forms of thyrotoxicosis, as well as those associated uniquely with the specificity of this disorder (Smith 2010). The severity of thyrotoxicosis varies between patients.

Diffuse enlargement of the thyroid gland is present in all cases of Graves’ disease. This enlargement is usually smooth and symmetrical, but asymmetry may be present too. The increased blood flow through the hyperactive gland often produces an audible bruit. The ophthalmopathy results in abnormal protrusion of the eyeball (exophthalmos) (Figure 2). The extra-ocular musculature is usually weak and it is possible that the exophthalmos will persist or progress further despite effective treatment, resulting sometimes in corneal injury. Pretibial myxoedema and, more appropriately, thyroid infiltrative dermopathy are terms used to describe localised lesions of the skin resulting from the deposition of hyaluronic acid, secondary to thyroid disease, which present as scaly thickening and induration. The lesions are slightly pigmented and often have an ‘orange peel’ texture, and papules or nodules may develop (Anderson and Miller 2003). Laboratory findings in Graves’ disease include elevated serum T₃ and T₄, as well as depressed serum TSH levels (Cheng et al 2010).

### TABLE 2

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum thyroxine (T₄)</td>
<td>4.5-12.0μg/dL</td>
</tr>
<tr>
<td>Free thyroxine (FT₄)</td>
<td>0.7-1.9ng/dL</td>
</tr>
<tr>
<td>Serum triiodothyronine (T₃)</td>
<td>80-180ng/dL</td>
</tr>
<tr>
<td>Free triiodothyronine (FT₃)</td>
<td>230-619pg/dL</td>
</tr>
<tr>
<td>Triiodothyronine resin uptake (T₃RU)</td>
<td>26-42%</td>
</tr>
<tr>
<td>Thyroid-stimulating hormone (TSH)</td>
<td>0.5-6.0μU/mL</td>
</tr>
</tbody>
</table>

(Cheng et al 2010)

### TABLE 3

<table>
<thead>
<tr>
<th>Signs</th>
<th>Symptoms</th>
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<tbody>
<tr>
<td>Tachycardia</td>
<td>Palpitations</td>
</tr>
<tr>
<td>Tremors</td>
<td>Nervousness</td>
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<tr>
<td>Weight loss</td>
<td>Alterations in appetite</td>
</tr>
<tr>
<td>Muscle weakness</td>
<td>Fatigue</td>
</tr>
<tr>
<td>Thyroid hypertrophy</td>
<td>Frequent bowel movements</td>
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<tr>
<td>Diplopia (double vision)</td>
<td>Sleep disturbance (insomnia)</td>
</tr>
<tr>
<td>Exophthalmos (protrusion of the eyeball)</td>
<td>Exertional intolerance and dyspnoea</td>
</tr>
<tr>
<td>Dependent lower-extremity oedema</td>
<td></td>
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</tbody>
</table>

(Davies and Larsen 2008)

### FIGURE 2

Characteristic appearance of exophthalmos
Diffuse and multinodular goitre

The enlargement of the thyroid gland, also known as goitre, is one of the most common manifestations of thyroid disease (Braverman 2001). Diffuse and multinodular goitres reflect impaired synthesis of thyroid hormones and are most often caused by dietary iodine deficiency (Braverman 2001). Impairment of thyroid hormone synthesis leads to a compensatory rise in serum TSH levels, with consequent hypertrophy and hyperplasia of the thyroid follicular cells, causing gross enlargement of the thyroid gland (Zbucki et al 2007). The compensatory increase in functional mass of the gland can overcome the hormone deficiency, achieving a euthyroid metabolic state. If the compensatory strategies appear to be inadequate, goitrous hypothyroidism develops (Pelizzo et al 2010).

The dominant clinical features of goitre are caused by the effects of the enlarged gland (Wright-Pascoe 2010). Besides altered body image, goitres may also cause airway obstruction and compression of large vessels in the neck and upper thorax (Telusca et al 2010).

Neoplasms of the thyroid

Thyroid neoplasms include a significantly high variety of morphological patterns (Wu and Liu 2010). A follicular adenoma is a benign encapsulated mass of follicles (Baloch and LiVolsi 2002). Generally these are solitary. If there are multiple nodules in a lobe or a thyroid gland, it is probably more appropriate to make a diagnosis of multinodular goitre with adenomatous change (Pal et al 2008). One important characteristic of non-neoplastic disease is that it does not seem to be a precursor of malignant disease (Mai et al 2001). Malignant neoplasms may also occur in the thyroid gland (Baloch and LiVolsi 2002). Papillary carcinoma is the most common malignant tumour of the thyroid gland in countries that have diets which are either iodine-sufficient or iodine-excessive (Nosé 2010). Iodine-rich food include fish, cheddar cheese, eggs and seaweed. This form of carcinoma behaves in an indolent manner (develops at a slow rate or in a way that may be easily confused with a benign thyroid disorder) and has good prognosis following treatment (Khanafshar and Lloyd 2011). There are other forms of malignancy in the thyroid gland, such as follicular carcinoma, anaplastic tumours, sarcoma, squamous cell carcinoma and medullary and micromedullary carcinomas. These forms of malignancy occur less frequently, compared with papillary carcinomas, and have a less favourable prognosis, depending on the spread of the malignant lesion and its stage of development (LiVolsi and Baloch 2004).

Thyrodesctomy

Surgical intervention generally involves one of six different procedures (Lang 2010):

- Partial thyroid lobectomy – removal of the upper or lower portion of one lobe.
- Thyroid lobectomy – removal of one entire lobe.
- Thyroid lobectomy with isthmusectomy – removal of one lobe and the isthmus.
- Subtotal thyroidectomy – removal of one lobe, the isthmus and most of the other lobe.
- Total thyroidectomy – removal of the entire gland.
- Radical total thyroidectomy – removal of the entire gland and cervical lymphatic nodes.

As with any other surgical procedure, there are potential complications. These include damage to the recurrent laryngeal nerve and secondary hypoparathyroidism (Pasieka 2005). However, the procedure is generally well tolerated and can be performed with minimal disfigurement (Bliss et al 2000).

Potential complications and post-operative nursing care

The initial post-operative phase begins when the patient arrives in the post-anaesthetic recovery room. Nursing care should be directed at assessing and maintaining cardiopulmonary and neurological status, comfort level and metabolic state (Roberts and Fenech 2010). The second post-operative phase begins when the patient
is transferred to the surgical care unit. Nurses should be aware of the most common complications that can occur in these patients, including bleeding, wound infection, nerve injury, lymphatic structure injury, secondary hypoparathyroidism and thyroid storm, as described below, and ensure that the appropriate actions are taken. Early detection and rapid response are key to ensure safe nursing practice and positive patient outcomes (LeMone and Burke 2000) (Table 4).

**Haemorrhage** Symptomatic haemorrhage requiring surgical intervention occurs in approximately 0.1% to 1.5% of patients undergoing thyroid surgery (Burkey et al. 2001). It occurs mainly because of the abundant blood supply to the organ and as a result of the extensive dissection that occurs during removal of the thyroid gland. In the majority of patients, symptomatic haemorrhage occurs between six and 12 hours after the initial procedure (Rosato et al. 2004).

Post-operative nursing evaluation includes the frequent observation of the anterior and posterior dressings, since it is here where blood tends to accumulate (Kumrow and Dahlen 2002). This assessment is important and monitoring should include a comparison of any changes with the initial assessment after arrival from the post-anaesthetic recovery ward. All observations need to be documented, as well as drainage volumes, consistency, colour and the functional status of drainage equipment (LeMone and Burke 2000). The suction drain is commonly used to avoid accumulation of blood and serum (seroma) following thyroid surgery (Morrissey et al. 2008).

Neck dressings should be monitored closely for changes in fit and comfort, with inspection of the dressing’s edge to detect possible neck swelling. A change in the circumference of the neck may indicate the formation of a haematoma (Burkey et al. 2001). Special attention must given to the patient’s vital signs, including detection of hypotension and tachycardia, as these may indicate haemorrhage. Other warning signs of possible haematoma include respiratory distress, neck pain, cervical pressure, dysphagia and increased blood drainage (Bononi et al. 2010).

**Wound infection** Thyroidectomy wounds (Figure 3) should be observed for signs of infection. Infection is often caused by the *Staphylococcus* or *Streptococcus* species. However, post-operative thyroidectomy wound infections are relatively rare, occurring in only 0.3-0.8% of cases (Rosato et al. 2004). The presence of an odorous discharge should be reported to the surgical team. The patient’s temperature should be monitored closely, as should his or her white blood cell count (Osmólski et al. 2006). Antibiotic prophylaxis is recommended only in immunocompromised individuals or those with valvular cardiac disorders (Rosato et al. 2004).

**Nerve injury** Injury to the recurrent laryngeal nerve is one of the most serious complications of thyroid gland surgery. It may be caused by different mechanisms, including incision, clamping, stretching of the nerve, nerve skeletonisation (a process in which a small fibre of the nerve is divided from the main structure), local compression of the nerve as a result of oedema or haematoma, or even thermal injury caused by electrocoagulation (Hillermann et al. 2003, Randolph et al. 2004, Goncalves Filho and Kowalski 2005). In most cases, this type of injury is not observed during the surgical procedure, therefore nurses need to monitor the patient’s voice quality, swallowing reflex and respiratory status post-operatively (Beldi et al. 2004). There may be transient vocal cord paresis lasting no more than six weeks but if this continues for six to 12 months with no improvement the damage is deemed to be permanent (Hermann et al. 2004).

Bilateral recurrent laryngeal nerve injury can also occur and is a serious complication because it results in near-midline paralysis of the vocal cords and variable degrees of airway obstruction. It is commonly diagnosed directly after extubation or during the early post-operative phase (Dralle et al. 2004, Hermann et al. 2004). Patients with this type of nerve injury present with inspiratory stridor, dyspnoea, tachypnoea and nasal flaring (Fewins et al. 2003). It may be necessary to perform a definitive tracheostomy or a transverse laser cordotomy if the vocal cords fail to recuperate after a waiting period of nine to 12 months. During this period the airway is protected by performing a temporary tracheostomy. Aspiration may occur,
but is more likely with superior laryngeal nerve injury. In this kind of iatrogenic lesion, there is partial or total loss of the protective airway reflexes, depending on the severity of the nerve injury, leading to potential choking, difficulty swallowing and problems with singing or yelling (Friedman et al 2002).

**Injury of the lymphatic structures** Lymph node dissection, as part of thyroid surgery, may result in injury to the thoracic and lymphatic ducts. Chyle leak, which is an iatrogenic rupture of lymphatic ducts, is characteristic of this type of injury (Reeve and Thompson 2000). Diagnosis is often delayed because early drainage resembles blood rather than chyle. However, in a few days following surgery, nurses can detect a continuous drainage of a milky or opaque fluid (chyle) – mainly constituted of fat, free acids, sphingomyelin, cholesterol and phospholipids – from the operative site.

### TABLE 4

<table>
<thead>
<tr>
<th>Nursing diagnosis</th>
<th>Risk factors</th>
<th>Nursing interventions</th>
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<tbody>
<tr>
<td></td>
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<td>Auscultation of breath sounds, noting presence of rhonchi.</td>
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<td>Assess for dyspnoea, stridor and cyanosis.</td>
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<td>Note quality of voice.</td>
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<td>Support the patient’s head with pillows.</td>
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<td>Assist with repositioning, deep breathing exercises and/or coughing as indicated.</td>
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<td></td>
<td>Suction mouth and trachea as indicated.</td>
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<td>Regularly check dressing conditions and the area under the patient’s neck and shoulders for drainage.</td>
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<td>Assess neck dressing for signs of tightness.</td>
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<td>Assess neck for signs of swelling, which is frequently related to haematoma formation.</td>
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<td>Keep communication simple.</td>
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<td>Provide alternative methods of communication.</td>
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<td>Anticipate needs as far as possible.</td>
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<td>Visit the patient frequently.</td>
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<td>Maintain a quiet environment.</td>
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<td><strong>Risk of tetany</strong></td>
<td>Chemical imbalance.</td>
<td>Monitor vital signs: remaining alert for elevated temperature, tachycardia,</td>
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<td></td>
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<td>dysrhythmias, respiratory distress and cyanosis.</td>
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<td>Evaluate reflexes periodically.</td>
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<td>Observe for neuromuscular irritability (twitching, numbness, paraesthesias, positive Chvostek’s and Trousseau’s signs, seizure activity).</td>
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<td>Keep side rails raised/padded, the bed in low position, and an artificial airway</td>
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<td>at bedside.</td>
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<td></td>
<td>Avoid use of restraints.</td>
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<tr>
<td><strong>Acute pain</strong></td>
<td>Surgical manipulation. Post-operative oedema.</td>
<td>Assess verbal and non-verbal reports of pain, noting location, intensity and duration.</td>
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<td></td>
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<td>Place in semi-Fowler’s position (head and torso at a 30-45 degree angle) and support head/neck with sand bags or small pillows.</td>
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<td>Maintain the head and neck in a neutral position and support during position changes.</td>
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<td>Instruct the patient to use hands to support the neck during movement and to avoid hyperextension of the neck.</td>
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<td>Keep the call bell and frequently needed items within easy reach of the patient.</td>
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<td>Give cool liquids or soft foods, such as ice cream or ice lollies.</td>
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<td>Encourage the patient to use relaxation techniques.</td>
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<tr>
<td><strong>Deficient knowledge regarding condition, prognosis, treatment, self-care and discharge needs</strong></td>
<td>Misinterpretation. Unfamiliarity with information resources.</td>
<td>Review the surgical procedure and future expectations.</td>
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<td>Discuss the need for well-balanced diet with foods high in calcium and vitamin D.</td>
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<td>Encourage a progressive general exercise programme.</td>
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<td>Apply cold cream after sutures have been removed.</td>
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<td>Discuss the possibility of a change in voice.</td>
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<td>Review drug therapy.</td>
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<td>Identify signs and symptoms requiring medical evaluation (fever, chills, continued and purulent wound drainage, erythema, gaps in wound edges, sudden weight loss, intolerance to heat, nausea and vomiting, diarrhoea, insomnia, weight gain, fatigue, intolerance to cold, constipation or drowsiness).</td>
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</tbody>
</table>

reaches the normal values of 9-10.5mg/dL (2.2-2.6mmol/L) (LeMone and Burke 2000). **Thyroid storm** Severe thyrotoxicosis or a thyroid storm is life-threatening. Once a common post-operative complication of thyroidectomy, it is now rarely seen. This is because appropriate pre-operative medical treatment is available and all patients undergoing elective surgery should now be euthyroid (Rosato et al 2000). A thyroid storm is characterised by exaggerated signs and symptoms of hyperthyroidism (Boxes 1 and 2) and usually

### BOX 1
**Signs and symptoms of a thyroid storm**
- Chest pain and shortness of breath.
- Tachycardia.
- Atrial fibrillation and high pulse pressure.
- Congestive heart failure.
- Agitation, restlessness and delirium.
- Psychosis.
- Coma.
- Tremor, nervousness and disorientation.
- Hyperpyrexia with flushing and sweating.
- Hyperpyrexia is out of proportion to other symptoms. (Jameson and Wooten 2008, Elisha et al 2010)

### BOX 2
**Management of a thyroid storm**
- Ensure adequate oxygenation.
- Administer glucose-containing intravenous fluids.
- Administer beta-adrenergic blockers.
- Administer sodium iodine.
- Administer propylthiouracil or methimazole.
- Administer glucocorticoids.
- Correct electrolyte imbalances.
- Correct acid-base imbalances.
- Administer paracetamol.
- Apply cooling blankets. (Jameson and Wooten 2008, Chong et al 2010)
complications following surgery, such as haemorrhage, haematoma, wound infection, or changes in the normal breathing pattern (Table 4).

Conclusion

The thyroid gland plays an essential role in the regulation and maintenance of important physiological and metabolic functions in the human body. There are several disorders that might influence the normal functioning of the thyroid gland, including hyperthyroidism, Graves’ disease, diffuse and multinodular goitre and neoplasms. It is vital that healthcare professionals can identify the signs and symptoms of each disorder and begin timely interventions to prevent serious and life-threatening complications.

References


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