The value and role of skin and nail assessment in the critically ill:

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Abstract

Over the last ten years numerous political drivers have paved the way for the development of new and innovative models of practice within the critical care environment. Many of these new models of practice required practitioners to perform detailed and comprehensive patient assessment. Within critical care, respiratory assessment is increasingly regarded as an essential element of a critical care practitioner's profile. However, the assessment of other body systems has been adopted more slowly. This paper argues that skin and nail assessment should be ascribed a high priority within practitioners' scope of practice. The skin is the largest organ in the body. A wide range of diseases covering numerous pathologies and specialities manifest in changes in the skin and nails. There has been increasing realisation and recognition that there is a connection between the skin and systemic disease. The skin and nails can therefore give valuable diagnostic clues to underlying disease.

This paper offers practitioners an opportunity to develop and augment their knowledge and understanding of skin and nail assessment and its application to the critically ill patient.

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Key words

Skin, nail and hair assessment, clinical assessment, holistic care, systemic disease.

Introduction

Nursing within all specialties continues to face unprecedented growth and development. Since the early 1990's there has been a proliferation and expansion of nurses' roles. The impetus for these developments has been multifactorial but it would appear that within critical care there are three main drivers. Firstly, the reduction in junior doctor's hours (NHSME 1991) has encouraged nurses to develop roles that have traditionally been performed by medical staff. The Scope of Professional Practice (1992) has been significant in enabling nurses' role expansion and development. Comprehensive Critical Care (DOH 2000) and the implementation of the National Service Frameworks paved the way for innovative new models of practice to be developed and fostered the creation of new roles for practitioners. For example, the development of Critical Care

Outreach services. Many of these new roles and developments required practitioners to develop history taking and assessment skills (Hind et al 1999). It is increasingly acknowledged that the development of history taking and assessment skills is a key component of role development. The ability to undertake and document a clear and concise systems' assessment constitutes major aspects of the clinical practitioner's role. By expanding and developing this skill practitioners can ensure patients receive timely and necessary interventions.

As practitioners enter the realm of patient assessment, so begins the integration of essential elements of clinical care, observation, empathic listening and the techniques of examining and assessing different body systems and the development of the process of clinical reasoning. Critical care practitioners are increasingly performing respiratory assessment in the critically ill patient (Cox and McGrath 1999).

However, a literature search using Medline and CINAHL databases revealed limited education and publication regarding skin and nail assessment in the critically ill patient. This paucity of data may reflect an implicit hierarchy of knowledge with skin and nail assessment deemed as clinically superficial and thus positioned on the periphery of patient management. Coombs and Ersser (2004) highlight in their study that some aspects of nursing knowledge, for example skin and wound assessment, are not ascribed a high priority by medical staff and are arguably positioned inferiorly in relation to patient management. However, the skin is the largest organ in the body (Casey 2002). It has multiple functions including protection, thermoregulation, sensation and metabolism (Tortora and Grabowski 2000). A wide range of diseases covering numerous pathologies and specialities manifest in changes in the skin and nails. There has been increasing realisation and recognition that there is a connection between the skin and systemic disease. The skin and nails can therefore give valuable diagnostic clues to underlying disease.

This paper offers practitioners an opportunity to develop and augment their knowledge and understanding of skin and nail assessment and its application to the critically ill patient. The aim of this paper is to enable practitioners to develop a more holistic approach to the clinical assessment of the critically ill patient. Finally, common systemic disorders that can present as skin and nail conditions will be briefly explored.

Anatomy and Physiology

The skin accounts for 16% of the total body weight (Buxton 1999). It contains three layers: the epidermis, the dermis and the subcutaneous tissue. The most superficial layer, the epidermis, is

thin and devoid of blood vessels. The epidermis depends on the underlying dermis for its nutrition. The dermis is well supplied with blood and contains many different structures including the connective tissue, sebaceous glands, sweat glands and hair follicles.

Figure 1.0

The hair, nails and sebaceous and sweat glands are considered appendages of the skin. The nails protect the distal end of the fingers and toes. There are two types of sweat gland. The eccrine glands, which are widely distributed and open directly onto the skin surface and these glands are responsible for sweat production and have a role in maintaining the body temperature. In comparison, the apocrine glands are found chiefly in the axillary and genital regions and usually open into hair follicles and are stimulated by emotional stress. Bacterial decomposition of apocrine sweat is responsible for adult body odour (Bickley 2003).

Three pigments maintain normal skin colour: melanin, carotene and haemoglobin. (Tortora and Grabowski 2000). The amount of melanin is genetically governed and is increased by sunlight.

Carotene is a golden yellow pigment that exists in subcutaneous fat. Haemoglobin, which circulates in the red cells and carries most of the oxygen of the blood, is found in two forms. Oxyhaemoglobin, a bright red pigment, predominates in the arteries and the capillaries. An increase in the blood flow through the arteries and the capillaries causes increased reddening of the skin whilst the opposite produces pallor. As blood passes through the capillary bed some of the oxyhaemoglobin loses its oxygen to the tissues and becomes deoxyhaemoglobin. This is darker and has a bluer pigment. An increase in deoxyhaemoglobin presents as cyanosis. There are two kinds of cyanosis. Central cyanosis occurs when the oxygen level in the arterial circulation is low. Peripheral cyanosis occurs when the cutaneous blood flow is for some reason decreased and slow and the tissues extract more oxygen from the blood than usual, as in low cardiac output states.

Functions of the skin

The skin has numerous functions that help to maintain homeostasis (Tortora and Grabowski 2000). The skin provides a protective barrier against chemical, mechanical and thermal stress. It also protects against UVA rays, dehydration, and acts as a defence mechanism against microorganisms. Thermoregulation is achieved by the adipose tissue, which provides insulation; sweat glands also assist with this important function via the production of sweat, which allows heat loss. The skin contains many nerve receptors that enable the sensations of touch, pressure, temperature and pain to be communicated to the central nervous system. Finally, the skin has a metabolic function. It is responsible for the synthesis of vitamin D.

Techniques of examination.

The entire surface of the skin should be examined in good light. A warm but well lit environment is essential for a comprehensive examination of the patient. Patients' privacy should be considered throughout the assessment process. Practitioners should make a point of touching patients where appropriate and with permission, thus enabling them to gain important information about the skin texture and temperature.

Firstly, a general examination of the patient should be undertaken. Patients' height, build and weight should be noted. For example is there evidence of weight loss, which could be indicative of underlying malignancy, diabetes or hyperthyroidism. Evidence of weight gain may reflect heart failure or Cushing's Syndrome. Assess the temperature of the skin using the backs of the fingers against an area of the patient's skin. There would be generalised warmth in fever or hyperthyroidism, whilst warmth in a specific location might highlight an area of inflammation and infection. Assess if there are any odours of the body or the breath. For example the pear drop

smell associated with diabetes or the smell of alcohol or nicotine. The patient's colour should be assessed. Central cyanosis is best observed in the lips, oral mucosa and the tongue. However increased melanin might mimic cyanosis in darker skinned individuals. The red colour of oxyhaemoglobin should be noted and pallor due to its absence. The best locations for this are fingernails, lips and the mucus membranes. Practitioners should observe the skin for any other changes. For example jaundice may present in the sclera as well as appearing in the lips, hard palate, under the surface of the tongue and most obviously the skin. Observe for excessive dryness of the skin that might indicate an endocrine disorder, particularly hypothyroidism (Marsh 1999).

Inspection and Palpation

The nail beds should be assessed using the two assessment approaches that underlie a thorough skin assessment: inspection and palpation. The nails protect the distal ends of the fingers and toes. The nail plate gets its colour from the vascular nail bed. A fourth of the nail plate is covered by the proximal nail fold. The cuticle extends from this fold. Practitioners should inspect and palpate the fingernails and toenails. Their colour and shape and any lesions should be noted. Changes in the nail are frequently the result of a systemic disorder. Consequently, nail assessment provides useful diagnostic information to critical care practitioners during patient evaluation.

Disorders of the nails that manifest as systemic illness include clubbing. This affects the soft tissues of the terminal phalanx and an increase in the angle between the nail plate and the nail fold. The proximal nail fold when palpated feels spongy. 75% of clubbing is associated with pulmonary pathology, 10% is cardiac in origin and 10% is associated with hepatic and gastrointestinal conditions (Jefferies and Turley 1999).

Detachment of the nail plate (onycholysis) is due to separation of the nail plate from the nail bed beginning at the nail's distal tip. If it is extensive there may be complete loss of the nail plate. Onycholysis is seen in a variety of conditions including thyrotoxicosis, trauma, fungal infection and psoriasis (Buxton 2002). Spoon nails are characterised by concavity of the outer surface. This malformation is often seen in patients with severe iron deficiency anaemia. Other nail malformations include Lindsay nails: these are characteristic of chronic renal failure; the proximal half of the nail is white whereas the distal half is darker. Terry's nails are whitening of the proximal 80% of the nail leaving a small rim of peripheral reddening. They are seen in patients with heart failure, liver cirrhosis or non - insulin dependent diabetes. Beaus lines are transverse grooves on the fingernails seen in patients recovering from acute serious illness. Practitioners may be able to use this information to estimate the timing of the illness. Mees' lines are transverse white lines

distal to the cuticle and they are seen in Hodgkin's Lymphoma and other systemic disorders such as severe cardiac disease or renal disease.

Assessment of the patient's face may also reveal copious information pertaining to the patient's underlying condition or pathology. The subsequent discussion highlights the most common conditions, although the list is not intended to be exhaustive.

Certain cardiac conditions may be reflected in patients' facial expressions or skin appearance (Marsh 1999). Elfin facies are characterised by a short upturned nose, widely spaced eyes, full cheeks, deep husky voice and is often associated with congenital aortic stenosis (Marsh 1999). Head bobbing with each heartbeat (De Musset's sign) is associated with severe aortic regurgitation (Woods et al 2000). Corvisart's facies is characteristic of patients with aortic regurgitation or heart failure. Patients' faces are puffy and purplish with swollen eyelids and shiny eyes. Patients with mitral stenosis often have a pink face and slightly cyanotic cheeks. Xanthoma lesions may be present on the eyelids as yellow plaques or as tuberculous nodules on the elbows and knees. These lesions are due to deposition of fat in the connective tissue cells and are associated with hyperlipidemia.

Facial assessment may also be helpful in revealing certain autoimmune disorders. Scleroderma is characterised by a sharp nose and shiny, tightly drawn skin. Most patients have hyperpigmentation associated with areas of vitiligo. Systemic Lupus Erythematosus may present with a butterfly rash on the face. The patient with severe myxoedema has a dull, puffy face with a sallow colour and dry, rough skin. The oedema is particularly pronounced around the eyes and does not pit with pressure. Patients with Myasthenia Gravis facies will have drooping eyelids (ptosis). Weakness of the facial muscles can lead to paucity of expression and an apathetic look. Patients with Graves Disease (hyperthyroidism) will have eye signs (Marsh 1999) and these include lid lag, where the upper eyelid does not keep pace with the eyeball as it follows a moving object downwards from above. Exophthalmos (protruding eyes) and lid lag are evident and patients appear anxious.

Battles Sign is a classic sign of trauma and is indicative of a basal skull fracture with bleeding into the middle fossa (Mangione 2000). The patient with Parkinson's Disease tends to possess mask-like features with decreased blinking and a characteristic stare. The increased adrenal hormone production that results in Cushing's Syndrome produces a round or moon face with red cheeks, excessive hair growth and acne. Diagnostically this feature may be useful because it may infer long-term administration of steroids that are used to treat a variety of respiratory conditions, for

example chronic obstructive airways disease and asthma. Alternatively, Cushing's Syndrome may also be present in certain malignant conditions when tumours secrete adrenocorticotrophic hormone, for example small cell bronchogenic carcinoma (Jefferies & Turley 1999).

Skin mobility and turgor should be assessed by lifting a fold of skin and observing the ease in which the skin lifts up (mobility) and the speed in which it returns into place (turgor). Decreased mobility would be evident in oedema whilst decreased turgor would be observed in dehydration. The capillary refill test is also a helpful indicator of fluid status. This quick test is performed on the nail beds and monitors tissue perfusion and dehydration. Pressure is applied to the nail bed until it turns white, pressure is then removed. A pink color should return in less than 2 seconds after blanching. Blanch times that are greater than 2 seconds may indicate the following :

- Dehydration
- Shock
- Peripheral vascular disease (PVD)
- Hypothermia

Inspection of the skin can also demonstrate the presence of oedema. Oedema can be classified as either pitting or non-pitting. Non-pitting does not depress on palpation and is indicative of a localised inflammatory response and the skin is also red, warm and tender. Pitting oedema is found in the dependent body parts and in pitting oedema the depression made on palpation remains. Pitting oedema is indicative of congestive cardiac failure.

Lack of sensation as a result of neurological insult, cardiac and respiratory failure resulting in hypoxia leading to tissue necrosis, fluid and electrolyte imbalance and increased metabolic demands as a result of infection, poor nutritional status and the immunosuppressed profile of many critically ill patients are all factors that increase the critical care patient's risk of developing a pressure ulcer. It is imperative that practitioners perform a detailed, thorough skin assessment on all critically ill patients regularly and this aspect of patient care is ascribed a high priority by practitioners. Identifying at risk patients and performing a thorough skin assessment will achieve early detection or prevention of pressure ulcer formation and if required, appropriate interventions can be implemented. When performing skin assessment any evident lesions must be recorded and documented correctly.

Types of Skin Lesions

Practitioners need to familiarise themselves with correct terminology used to describe common skin lesions. This will aid communication and expedite patient management plans. There are two

types of lesions: primary and secondary. Primary lesions arise from previously normal skin (Bickley 2003). A papule would be described as elevated, firm, circumscribed and less than 1 cm in diameter. Examples of a papule include warts and drug related eruptions (Seidel et al 1995). Another example of a primary skin lesion is a nodule which is elevated, firm, circumscribed and palpable deeper in the dermis than a papule. A plaque has an elevated surface larger than 2cm. Papules can coalesce to form plaques. The lesions of psoriasis are examples of plaques. A tumour is elevated and solid and may or may not be demarcated and is greater than 2cm in diameter. A neoplasm is an example of a tumour. A wheal is an irregular, transient and localised area of skin oedema, for example a mosquito bite. Herpes simplex is an example of a vesicle: an elevated, circumscribed, superficial lesion less than 1 cm in diameter filled with serous fluid. A bulla is comparable to a vesicle except that it is greater than 1 cm in diameter, for example a second-degree burn. A pustule is similar to a vesicle but filled with purulent fluid, for example impetigo.

Secondary skin lesions arise from changes in primary skin lesions and are often the result of disease progression or manipulation (scratching or picking). Secondary skin lesions can be further categorised into two groups - loss of the skin surface and material on the skin surface. Erosion is the superficial loss of the epidermis that generally heals without scarring, for example the rupture of a vesicle. Excoriation is partial or complete loss of the epidermis and is the result of excessive scratching. An ulcerated lesion is the deeper loss of the skin surface. An ulcer may bleed and healing will result in a scar (Buxton 2002). The classic example of an ulcerated lesion is the ulcer of venous insufficiency. The final secondary lesion that is associated with loss of the skin's surface is the fissure. Fissures are linear cracks in the skin, for example the fissures commonly seen in athlete's foot.

Examples of secondary lesions that involve material on the skin include a crust. A crust is the dried residue of serum, pus or blood, for example impetigo. A scale is the result of heaped up keratinised cells that may be thick or thin, dry or oily and its colour may also be variable. An example of a scale is psoriasis.

Any lesions should be observed and their characteristics noted. The anatomic location of the lesion and its distribution over the body should be evaluated. The lesion's configuration and distribution should be documented, for example if they are linear: the lesions are arranged in line or clustered or annular arranged in a ring, for example fungal infections. An arciform formation consists of an arc or dermatomal covering an area on the skin that corresponds to a sensory nerve root, for example the unilateral dermatomal pattern typically seen in herpes zoster.

Critical care patients frequently exhibit many of these skin lesions either in the form of an allergic reaction to drug therapies or as a direct response of the underlying pathology or as a result of pressure sore formation. Critical care practitioners therefore need to ensure prompt referral to a clinical specialist if patients exhibit any of these lesions to ensure effective and appropriate treatments plans are initiated.

The skin and systemic disease

Clinical signs in the skin offer valuable diagnostic clues to underlying pathology. Sometimes the same condition affects both the skin and other organs. The skin is also a common target for allergic reactions with a rash being the first clinical sign. The cutaneous signs of systemic disease is a vast topic and beyond the remit of this paper. The presence of malignancy within the body can be signified by several dermatological conditions. The success or failure of treatment and the morbidity can be dependent on timely recognition of these cutaneous signs which may or may not be benign. The following conditions are the most common cutaneous manifestations of systemic disease.

Dermatomyositis: this is a rare condition that has a high association in adults with underlying carcinoma, commonly of the breast, lung, ovary or gastrointestinal tract. It is characterised by a localised erythema with a purple hue predominantly on the eyelids, cheeks and forehead (Buxton 1999). Acanthosis nigricans is also associated with an underlying malignancy and is recognised clinically by areas of hyper-pigmentation and velvety plaques usually in a symmetrical distribution. Frequently involved areas include the axillae, groin and neck. Acanthosis nigricans may be either benign or malignant but the condition is however associated with internal malignancy and usually indicates a poor prognosis because the underlying neoplasm is often aggressive. Average survival period for a patient with cancer-associated acanthosis nigricans is two years. The most common underlying carcinoma is adenocarcinoma of the gastrointestinal tract. The skin may also be affected by metastases. The most common cancers invading the skin include breast, prostate, kidney and gastrointestinal carcinoma.

Systemic Lupus Erythematosus (SLE) manifests cutaneously and is associated with a butterfly rash characterised by an erythematous blush located in the cheeks and bridge of the nose and may be the first sign of the disease. SLE may be associated with multisystem involvement, most commonly arthritis, renal disease, nervous system, gastrointestinal manifestations, and haematological abnormalities. The five-year survival rate is 95% with effective treatment (Mangione 2000).

A significant number of critically ill patients will present with a rash or develop rashes whilst treated in the acute care environment. Rashes are the result of complex responses occurring in the capillaries and arterioles of the skin causing erythema (Buxton 2002). Many disease processes present with erythema. The critical care practitioner therefore needs to be able to recognise the most common types of erythema and its possible causes. Many common drug reactions present with erythema. External contact with drugs can result in contact dermatitis that presents with eczematous changes. This type of reaction occurs commonly with Neomycin. Chloramphenicol may cause dermatitis around the eyes. Drugs used systemically can cause localised, fixed skin reactions or a more diffuse macular erythema. In the later stages exfoliation, shedding scales of the skin may develop (Buxton 2002). Antibiotics are the most common agents of this reaction. Penicillins are the most common cause of drug rashes that can range from acute anaphylaxis to persistent, diffuse erythematous lesions.

Certain diseases manifest by purpuric papules or purpuric bulla. Meningococcaemia presents with fever, sore throat and the development of a purpuric rash in an acral distribution. Staphylococemia also presents with sparse acral, palpable, purpuric lesions and patients frequently develop pustules on top of the primary lesions.

Conclusion

Critically ill patients need prompt assessment and intervention of their underlying disease processes. Assessment of the skin and nails requires no invasive therapies and yet because the skin is the largest organ in the body it reveals a plethora of diagnostic clues to both the experienced and inexperienced practitioner. Health care practitioners are increasingly developing complex assessment skills. This paper has presented a method of assessment that practitioners may find useful to adopt within their clinical practice. A brief overview of the many disease processes and pathologies that may manifest cutaneously has been outlined. It is hoped that the paper has helped critical care practitioners to ensure a comprehensive assessment of the patient's integument is included in the routine assessment of patients thereby ensuring a holistic and comprehensive model of care is delivered.

What is known about this topic and what this paper contributes to the topic

What is Known About This Topic

- Nurses are increasingly developing complex and advanced roles
- Respiratory assessment is now considered integral to the scope of practice of the critical care practitioner

- There is a paucity of literature relating to skin, hair and nail assessment.
- The skin is the largest organ in the body and should be ascribe a high priority in relation to patient assessment
- A multitude of disease processes manifest cutaneously

What This Paper Adds

- Offers practitioner's a structured and systematic method of assessment to utilise and incorporate into daily practice
- Practitioners should begin to incorporate skin, nail and hair assessment into their repertoire of clinical skills.

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