ADVANCED HEALTH ASSESSMENT & DIAGNOSIS

Student's name

Course

Tutor

Date

Advanced nursing practice in the United Kingdom

Advanced practice registered nurses are generalist or specialist nurses, who have attained advanced training in expanded clinical practice by achieving postgraduate nursing education. They possess advanced didactic clinical knowledge, skills and experience in the evaluation, planning and implementation of patient care. They also integrate healthcare theory, experience and practice and demonstrate autonomy in clinical judgement and intervention (Waller 1998).

The roles of advanced nursing practitioners have changed over the years as part of the process of health care restructuring in the United Kingdom. They are now an important part of the healthcare team in the region. The Royal College of Nursing created the first formal education programme for advanced nurse practice in the UK in the 1990s. This is when educational competency for nurse practitioners became a concern (London: Royal College of Nursing, 2008, revised 2010). They included consultancy skills, physical examination, disease screening, minor injury management, chronic disease management and health education and counselling. These areas comprised the new curriculums that were later structured and adopted throughout the UK (Royal College of Nursing, 2008, revised 2010).

Some significant professional developments that contributed to the growth of advanced nursing during the 1990s and 2000s include the government-led adoption of consultant nurses and the legalisation of non-medical prescribing (Department of Health, 2005; Waller 1998).Today, advanced nursing is promoted as a cost-effective service that can overcome the problems and workforce shortages that face the NHS (Department of Health 2006; Department of Health 2007). Nevertheless, advanced nurses are the best development in nursing practice, and a challenge to the traditions of the health profession (Department of Health 2007).

Introduction

The aim of this paper is to explore a clinical case with reference to the underpinning theory, and critically analyse and justify the following:

1. The process by which I gathered subjective & objective clinical data.

2. My decision making with regard to selected investigations, and

3. The processing and integration of the clinical data to reach a diagnostic hypothesis.

Descriptive history

Mrs. Smith, a 75 yr old lady, was brought into ED by ambulance with chief complains of increasing pain to her left calf over the previous 2 days. Prior to any formal subjective or objective assessment I undertook an informal rapid assessment. Mrs. Smith was clearly in a lot of discomfort clutching at her calf and saying "please do something about this pain". The pain had occurred gradually in the left calf, for two nights, with the pain described as being a constant throbbing & intense pain in nature. There was no history of any trauma to the left leg, it was more painful on weight bearing and was disturbing her sleep. She had taken regular co-codamol to relieve the pain with little effect. Based on the established cues, the initial tentative diagnostic hypothesis for Mrs. Smith's case was deep vein thrombosis.

Clinical reasoning

Thompson and Dowding (2002) propose information processing as the most influential model of decision making adopted by health professions. It has been widely applied by clinicians in making diagnoses (Thompson & Dowding 2002). It has also been widely used in nurse decision-making research (Muoni 2012; Thompson & Dowding 2002). Clinical information processing (clinical reasoning) is based on the research of Newell and Simon (Thompson & Dowding 2002). They studied how the human mind works when processing information. They proposed that the human short term memory is limited in capacity; there may be inadequate capacity to simultaneously analyse all the complex

information that may be pertinent to a situation. Therefore, the clinician will need to select the information that will be used to guide the decision making process; as much as this may not exhaust all the possible issues. The nurse, with varied information at hand, will not have the cognitive ability to incorporate all the information in decision making in one attempt. The nurse categorizes the information into a small number of initial hypotheses. These will also provoke the retrieval of memories of similar clinical cases. Therefore, the information is interpreted in a step by step manner until a decision is reached (Muoni 2012; Thompson & Dowding 2002).

Thompson and Dowding (2002) described four stages of the clinical reasoning process. The first stage is cue acquisition. This is the preliminary gathering of data about the patient through taking a comprehensive clinical history or looking at the patient's previous hospital visits. It can be done before or after meeting the patient. The nurse then generates hypotheses on the basis of the information obtained from the patient and the nurse's memory of previous similar clinical situations. The third stage is cue interpretation whereby the nurse applies the hypotheses in evaluating the information to ascertain whether it supports the hypotheses. Lastly, the nurse evaluates the hypotheses to establish whether the combined data verifies any of the available hypotheses. If no hypothesis is validated, the nurse repeats the process from the first stage.

Underpinning theory

The underpinning theory is based on ideas, explanations or motives that explain the justify the basis for a given action. The underpinning theory is applied in learning interventions in the form of the iceberg theory, which describes interventions in three elements: event, pattern and structure. The event comprises the obvious facts that are visible to the eye. In clinical case assessment, events are the patient's symptoms or health conditions. Secondly, patterns are the recurrences of a given event such that they occur in a specific

"pattern". Case series studies of a given disease entity establishes the characteristics symptoms of the disease such that a cluster of these symptoms can be used to make a working diagnosis. Lastly, the underlying structures of a clinical case include the causes; the pathological processes that produce the symptoms (A Comprehensive Guide to Global Issues and Sustainable Solutions, Wheeler, Wheeler & Church).

Cue acquisition

According to the first element of the underpinning theory (event), the event Mrs. Smith's case comprises her symptoms. I based the cue acquisition for Mrs. Smith's case on her obvious symptoms. Therefore, the most significant cue in her case was the severe left calf pain, which was intense, unremitting, aggravated by weight bearing on the limb and unrelieved by regular analgesics.

Based on the above cues, I proceeded to the hypotheses generation process. Diagnostic hypotheses are tentative explanations of the pathological process causing the symptoms at hand. These tentative diagnoses are based on previous experience with patients who had similar clinical conditions, the nursing practice model or the nursing protocols or standard nursing operating procedures (Henderson, Tierney & Smetana 2012). The most tentative hypothesis, in this case, was that Mrs. Smith had developed acute deep venous thrombosis. At her age, she was likely to be ambulating less, and thus she was at risk of DVT. The degree of pain was also very suggestive of DVT (Mclachlin, Richards, & Paterson 1962).

Based on pattern recognition from the underpinning theory, I developed the hypothesis that Mrs. Smith had DVT because all the previous cases of DVT that I had encountered had the same presentation. That is, DVT has formed a pattern of presenting with this cluster of symptoms; severe limb pain, swelling and redness.

Physical examination

Utilising the objective data gained through cue acquisition I went on to perform a musculoskeletal exam of Mrs. Smith's left lower limb. Upon inspecting Mrs. Smith I noted, swelling to her entire calf with bruising to the medial aspect. Palpating her calf revealed that it was firm, cool to the touch, and with a very faint pedal pulse. Mrs. Smith complained of 10/10 pain on palpation of the entire calf muscle with reduced sensation to her foot and a capillary refill time of 3 seconds. Her left leg was swollen, painful and appeared ischemic. I compared the swelling of her left leg to the right by measuring the circumference of both limbs 10 centimetres below the tibial tuberosity and 15 centimetres above the upper limit of the patella. She also had oedema and dilated superficial collateral veins on the left side. There was also tenderness on deep palpation of the popliteal fossa of her left limb. These examination findings further suggested deep venous thrombosis. According to the underpinning theory, these further comprise the "patterns" of presentation of deep venous thrombosis.

However, some signs such as a firm, cool, and ischemic limb that has a poor pedal pulse would point to other clinical diagnoses, especially compartment syndrome. Therefore, I also considered other conditions that would explain Mrs. Smiths's examination findings. According to the underpinning theory, these would now comprise the underlying "structures" that comprise the cause of the symptoms. Mrs. Smith could have had other medical problems like a fracture of the tibia or fibula following unnoticed trivial trauma. At her age, she could be having postmenopausal osteoporosis, which would weaken her bones, and make them more liable to fractures when subjected to minor trauma. Other than these, she could have cellulitis of the affected calf which irritates the cutaneous nerves and trigger the severe pain sensation. Other less relevant possibilities were baker's bursitis. These diagnostic hypotheses were the alternative ones other than DVT.

Tentative hypothesizing refers to inferring a property of the case at hand (that is the patient) from previous experience of similar cases. A tentative diagnosis is one which is worth

testing and is formulated through closed questioning (Thompson and Dowding 2002). For Mrs. Smith; the description of the pain as constant, intense and unresponsive to co-admol are the most important factors that point to the hypothesis that she has deep venous thrombosis. On the other hand, intuition is judgment without rationale (Muoni 2012). Thompson and Dowding (2002) assert that intuition is a skill that the nurse acquires through previous experience, and it plays a significant role in expert nursing practice. My first deduction, that is, Mrs. Smith had deep venous thrombosis, was by intuition. Most of my previous patients who had calf pain and swelling were diagnosed with deep venous thrombosis.

Additionally, nurse theorists describe intuition as spontaneous and irrational thinking process that develops out of expertise and experience (Muoni 2012; Thompson and Dowding 2002). Thompson and Dowding (2006) also assert that intuition requires the nurse's involvement with the client, in order to consider the client's story and how the illness has affected their lifestyle, in order for the nurse to view the patient's situation according to his or her clinical experience and expertise. Intuition is closely related to heuristics, which involves the experience-based methods for problem solving (Muoni 2012). Being different from the clinical reasoning methods proposed by Thompson and Dowding (2002), heuristics speeds up the process of finding a suitable solution. In other words, heuristics is a mental short cut for reducing the workload of decision making (Muoni 2012). As in Mrs. Smith's case, any health practitioner would consider the diagnosis of deep venous thrombosis in a patient with intense calf pain, swelling and erythema.

However, intuition alone would have led to a less satisfactory diagnostic hypothesis for Mrs. Smith's case. I had to apply correct cue interpretation in order to arrive at a successful diagnosis (Thompson and Dowding 2002). Correct cue interpretation involves the review of evidence (symptoms and hypotheses) through hypotheses evaluation. This involves rechecking the evidence before planning and implementation. The evidence is examined to

further support the diagnostic hypothesis or to refute it. The nurse then selects the evidence preponderant hypothesis to guide treatment planning and implementation (Muoni 2012; Thompson and Dowding 2002).

Going back to Mrs. Smith's case, I reconsidered my tentative diagnosis of DVT after I found out that Mrs. Smith was on anticoagulation therapy. Through hypothesis evaluation, I concluded that DVT would be less likely in her case because she was already on prophylactic therapy. However, I also still considered this diagnostic hypothesis because the warfarin may have been started after she developed DVT. Nevertheless, I changed my tentative diagnostic hypothesis to a differential diagnosis of DVT. I started collecting cues that would suggest a differential of DVT, of which, compartment syndrome was the closet.

Differential diagnosis of deep venous thrombosis other than compartment syndrome

Deep venous thrombosis is an entity in the group of diseases called venous thromboembolism. It involves the presence of a blood clot (thrombus) in one of the deep veins through which blood flows back to the heart. It commonly occurs in the veins of the lower limbs, especially at the level of the calf and the thigh (Makris & Watson 2001). The differential diagnoses of DVT include conditions that present with the same symptoms and signs.

Cellulitis of the lower limb is the commonest medical condition that would present with calf pain and swelling; resembling the presentation of deep venous thrombosis (Makris & Watson 2001). Cellulitis is an acute non-necrotizing inflammatory process involving the skin and subcutaneous tissues while sparing thee deep fascia and muscles. It presents as localized swelling, erythema, pain, tenderness and warmth. It does not produce abscesses, purulent drainage or ulceration (Makris & Watson 2001; Stevens et al 2005). Cellullitis has been found to more common among the geriatric population; to which Mrs. Smith belongs (Lederman et al. 2008).

Superficial thrombophelibitis is also a common differential diagnosis for deep venous thrombosis of the lower limb. It is an inflammatory-thrombotic disorder that develops when a thrombus occurs in a superficial vein (Tovey & Wyatt, 2003). The thrombus then acts as a nidus for bacterial infection. As the bacteria colonise the thrombus they cause phlebitis of the vein and surrounding tissue (Scottish Intercollegiate Guidelines Network, 2010; Tovey & Wyatt, 2003). It mostly affects the varicosities of the great saphenous vein, but it can also affect the lesser saphenous vein. Authorities postulate that it is associated with one component of the Virchow's triad; that is, turbulent blood flow or stasis, changes in blood components that lead to hypercoagulability, and intimal damage (following trauma, inflammation or infection) (Mclachlin, Richards & Paterson 1962; Meissner et al. 2002). Superficial thrombophlebitis may present with swelling, redness and tenderness that is distributed along the course of the vein. Bleeding can also develop from the infected site. Superficial thrombophlebitis may progress to involve the deep veins (Mclachlin, Richards & Paterson 1962; Scottish Intercollegiate Guidelines Network, 2010; Tovey & Wyatt 2003; Verlato et al. 1999).

A ruptured baker's cyst is the most common cause of swelling in the popliteal fossa. It arises from the escape of synovial fluid from the knee joint cavity and its accumulation in the gastrocnemio-semimembranosus bursa, thus causing distension. An inflamed baker's cyst may present with pain, redness and tenderness especially if the inflammation spreads to other soft tissues (Baker 1994). It is commonly precipitated by osteoarthritis of thee knee joint in the elderly (Baker 1994; Pinnamaneni & Thomas 2008). The patient in this case may have developed a baker's cyst that occludes the venous drainage of the lesser saphenous vein causing subsequent thrombophlebitis.

DVT diagnosis

The old cart mnemonic describes seven attributes of patient's symptoms, especially pain, which is used to take a detailed patient history. These attributes include onset, location, duration, and character, aggravating factors, radiation, timing and severity (Henderson, Tierney & Smetana 2012). On the other hand, the wells criteria are a validated clinical prediction for the pre-test probability of DVT. It classifies patients to be either at high, moderate or low risk of having DVT, on the basis of ten factors that give a total score ranging from -2 to 9. A score of less than 2 implies a low probability for DVT while a score of greater than 2 implies that DVT is likely. The pertinent factors include active cancer, limb swelling of more than 3cm compared to the contralateral limb, collateral superficial veins, pitting oedema of the limb, swelling of the entire limb, localized tenderness along the course of a deep vein, recently bed-ridden, previous deep vein thrombosis and recent paralysis or immobilization of the affected limb (Scottish Intercollegiate Guidelines Network 2010).

According to Maelen and Raina (2007) the wells criteria have moderate sensitivity and poor specificity such that it has limited use in primary care diagnosis of DVT. They established that the Wells criteria have a sensitivity of 82% at 95% confidence interval, a specificity of 22.5% and a pre-test probability of 12%. The current gold standard test for DVT is venography, which is both expensive and invasive. Therefore, other non-invasive tests like D-dimer testing and venous ultrasonography have been validated for DVT. However they have to be combined in order to improve the pre-test probability (Mcrae & Ginsberg 2004).

As part of my hypothesis evaluation process, I considered that DVT may be unlikely in Mrs. Smith's case because she was already on warfarin. She may have already developed a non-resolving thrombus in the deep veins of the calf but the fact that she was on warfarin down-played DVT as a formidable diagnosis. Thus, I had to consider the differential diagnoses of DVT because anticoagulation reduces the risk of DVT. Compartment syndrome was the next condition that would present with intense unremitting calf pain with associated

firmness, tenderness, and coldness of a limb. It would be common on calf region due to the little room for expansion in calf fascial compartments (Rizzoli et al. 2013).

Compartment syndrome

Acute compartment syndrome involves raised tissue pressure in a closed fascial compartment, which exceeds the perfusion pressure and leads to nerve and muscle ischemia. It commonly occurs in the limbs following a trauma, such as a fracture. This patient, considering her age, may have suffered a fracture of the tibia or fibula following an unnoticed trauma. Long standing postmenopausal osteoporosis in may have led to bone weakness and predisposition to fractures following trivial injury. This then leads to an insidious onset of compartment syndrome (Feliciano et al. 1988; Rizzoli et al. 2013). When tissue pressure exceeds the venous pressure, blood flow out of the compartment is impaired. This leads to accumulation of metabolic waste products, resulting in severe pain and distal sensory loss due to nerve irritation. The pain is deep, aching in nature and is aggravated by both passive and active muscle contraction (Feliciano et al. 1988). At a later stage, compartment syndrome presents with loss of arterial pulse distal to the pathological site, because the tissue pressure finally exceeds the arterial pressures thus occluding the arteries. Late manifestations also include peripheral paresis and hypoesthesia. The patient usually describes a feeling of swelling and tightness over the affected region (Feliciano et al. 1988; Rizzoli et al. 2013).

Physical examination of a limb affected by compartment syndrome is cantered on the five P's of limb ischemia. These include pain, pallor, pulselessness, poikilothermia and paresthesia. However these signs point to late stage disease, when irreversible and extensive tissue damage may have occurred. A firm limb with a wooden feel is also a very important sign of acute compartment syndrome (Feliciano et al. 1988; Howard, Mohtadi, & Wiley 2000).

International normalised ratio

INR is the best method for testing blood hypercoagulability. It provides a standard means of estimating the effect of oral anticoagulants, such as warfarin, by comparing a patient's prothrombin time to a control value (the average of prothrombin times of about 20 healthy subjects). Prothrombin is the time it takes for plasma to clot (Jackson, Esnouf & Lindahl 2003). It also incorporates an entity called international sensitivity index which compares the accuracy of machines that test clotting time to the international standard. This way, prothrombin time results from various laboratories across the world can be compared (Tripodi 2004). The INR formula is:

$$INR = (prothrombin_{test} / prothrombin_{control})^{ISI}$$

In Mrs. Smith's case, INR would be important to detect hypercoagulability. At INR of below 2, the risk of thromboembolism is high and may precipitate deep venous thromboembolism, and subsequent cardiac arrest, pulmonary embolism or ischemic stroke (Feliciano et al. 1988; Howard, Mohtadi, & Wiley 2000; Rizzoli et al. 2013). Therefore, I tested her INR to rule out ongoing or impending venous thromboembolism (Feliciano et al. 1988). The INR value of 12 was extremely out of range. The normal INR values range between 2.0 and 3.0 (Tripodi 2004). The INR of 12 would imply that Mrs. Smith is at a very high risk of bleeding following trivial bruising. It further suggests that Mrs. Smith has developed over anticoagulation from her warfarin anticoagulant therapy (Cruickshank, Ragg & Eddey 2001). The sensitivity of INR for detecting DVT is estimated at 100% when the INR is greater than 1.7, with a specificity of 90.5%. However, the sensitivity drops to 62.5% when the INR value is below 1.7 (Jack & Agnes 2002).

Conclusion

Mrs. Smith case was an interesting way of breaking down a clinical case according to the underpinning theory. Her symptoms, which would be the events in the theory, strongly supported the hypothesis that she had acute deep venous thrombosis. This hypothesis was

further supported by the physical examination findings. Previous studies on deep venous thrombosis describe these clinical features to be characteristic of DVT; thus they comprise its pattern of presentation. However, the cause of the problem could have been a different condition which drove me to probe further through investigational findings. Specifically, the high INR findings steered the diagnosis away from DVT prompting investigations for the next major medical condition that would mimic DVT, compartment syndrome. Thus, I examined Mrs. Smith's vase systematically until I arrived at the most likely diagnosis.

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