



Fatigue: a concept analysis

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Abstract—Fatigue is probably the most common symptom of illness affecting sufferers of both acute and chronic conditions. However, confusion surrounds the definition and use of the term fatigue. As with many other nursing concepts, it is a word that is commonly used in colloquial language. This concept analysis aims to identify the attributes that are essential to the concept of fatigue, and to distinguish between its colloquial and its nursing usage by following the strategy suggested by Walker and Avant (1995, *Strategies for Theory Construction in Nursing*, Appleton Lange, London). A review of the literature identifies nursing uses of the term fatigue which reflect and conflict with colloquial uses. Defining attributes, demonstration cases, antecedents, consequences and empirical referents are identified before a definition of fatigue is developed and proposed for nursing. This clarification of the phenomenon has particular relevance for clinical nursing, future research and the development of fatigue theories. Copyright © 1996 Elsevier Science Ltd.

Introduction

Concept analysis is a process whereby concepts are logically and systematically investigated to form clear and rigorously constructed conceptual definitions. Such precise definitions allow researchers to identify the presence of phenomena, to investigate their properties, and by studying the relationships between them, to develop theory (Walker and Avant, 1995). However, despite the importance of this process, concept analysis has only recently gained major attention within the nursing literature (Schwartz-Barcott and Kim, 1986) and many phenomena of interest to nurses remain poorly or ambiguously defined.

Fatigue is one such phenomenon. Even though it is probably the most common symptom of illness, affecting sufferers of both acute infectious conditions such as influenza (Straus,

1991) and chronic diseases including cancer (Aistairs, 1987), multiple sclerosis (Hart, 1978; Krupp *et al.*, 1988) and renal failure (Cardenas and Kutner, 1982; Srivastava, 1989), confusion surrounds the definition and use of the term fatigue.

As with many other nursing concepts, fatigue is a word that is commonly used in colloquial language. This poses a problem, for as Norris (1982) identified, ordinary language lacks the structure necessary for a scientific discipline and the scientific usage has to be differentiated from the everyday usage.

This concept analysis aims to identify the attributes that are essential to the concept of fatigue, and to distinguish between its colloquial and its nursing usage by following the strategy suggested by Walker and Avant (1995). Accordingly, all uses of the concept are identified, model and additional cases are constructed, and antecedents, consequences and empirical referents are defined.

Uses of the concept fatigue

Dictionary definitions

The term fatigue is of both Latin and French origin. According to *The Oxford Dictionary of English Etymology* (1966) the Latin word 'fatigare', from which the word fatigue is derived, means "to exhaust as with riding or working, to weary or to harass". Likewise, the French word 'fatiguer' means to tire. These origins are reflected in the current dictionary definitions which predominantly describe the concept as being related to exertion:

1. *n.* "physical or mental exhaustion due to exertion" (*Collins English Dictionary*, 1979), "lassitude or weariness resulting from either bodily or mental exertion" (*The Oxford English Dictionary*, 1989);
2. *Physiol.* "the temporary inability of an organ to respond to a stimulus because of over activity" (*Collins English Dictionary*, 1979), "a condition of muscles, organs or cells characterised by a temporary reduction in power or sensitivity following a period of prolonged activity or stimulation" (*The Oxford English Dictionary*, 1989);
3. *a vb.* "to make or become weary or exhausted" (*Collins English Dictionary*, 1979), "to tire, weary; to harass with toil; to exhaust with labour" (*The Oxford English Dictionary*, 1989); *b vb.* "to induce a condition of fatigue in a muscle, organ etc." (*The Oxford English Dictionary*, 1989);
4. *4a n.* "any of the mainly domestic duties performed by military personnel especially as a punishment" (*Collins English Dictionary*, 1979), "the extra-professional duties of a soldier, which cause weariness, sometimes allotted to him as punishment for misdemeanour" (*The Oxford English Dictionary*, 1989); *b n.pl.* "short for fatigue-dress, special clothing worn by military personnel to carry out fatigue duties" (*Collins English Dictionary*, 1979; *The Oxford English Dictionary*, 1989);
5. *n.* "the weakening of a material due to alternating stresses, especially vibrations" (*Collins English Dictionary*, 1979), "the condition of weakness in metals or other solid substances caused by cyclical variations in stress, known as metal fatigue" (*The Oxford English Dictionary*, 1989).

The word fatigue therefore, has many uses in the English language. It can be used as both a noun or a verb, and in general or specific situations, such as its use within military or

particular scientific contexts. However, despite these diverse applications, the definitions are closely related to one another. They share four similar characteristics;

1. fatigue follows exertion;
2. fatigue is associated with physical or mental weariness and exhaustion;
3. fatigue comprises comfortless, troublesome or odious feelings, hence "fatigues" being a punishment;
4. fatigue causes decreased functional ability, which is often temporary.

Roget's International Thesaurus (1988) suggests that fatigue, when used as a noun, may be classified alongside words such as tiredness, weariness, faintness, weakness, debility, lassitude, exhaustion, collapse and prostration, to name a few. When used as a verb similar words include to tire, exhaust, weary, wilt and to lag.

The definition of fatigue provided by Mosby's *Dictionary of Medical, Nursing and Allied Health* (1990) is similar, denoting a state of exhaustion or loss of strength and ability that follows an episode of physical activity or a period of emotional and mental pressure.

Usage of the concept in ergonomics

Fatigue has been studied for almost 75 years. Preliminary studies were conducted during the First World War when researchers investigated the impact of fatigue on the efficiency and productivity of the industrial workforce. These ergonomic studies focused particularly upon the munitions industry (Cameron, 1973) where the optimal productivity of the workforce was vital. Similarly, during the Second World War, investigations focused on activities which were central to the "war effort" when researchers investigated the impact of fatigue on the breakdown in skilled performance of aviators. The classical works of Drew (1940) and Davis (1948), both cited by Crosby (1991), are typical of these.

Research in this area continued into the 1950s when Pearson and Byars (Pearson, 1957) developed a fatigue checklist for airmen. This measured the subjective quality of fatigue in relationship to the psychomotor tasks which pilots had to perform. This checklist was later used in several nursing studies (Haylock and Hart, 1979; Rieger, 1987).

A further group of researchers, the Japanese Industrial Fatigue Research Committee Of The Japanese Association of Industrial Health, performed ergonomic studies in Japan into the effects of fatigue. Their investigations focused on the levels of fatigue among bank workers, broadcasting workers, industrial shift workers and secretaries. Their work also culminated in the development of a fatigue symptom checklist (Yoshitake, 1971). Similarly, this checklist has been used in several nursing studies (Hart, 1978; Davis, 1948; Srivastava, 1989).

Usage of the concept in health-related disciplines

Following the pioneering work of ergonomists, and with the realisation that fatigue often affects ill individuals, health care professionals turned their attentions to describing and defining fatigue. However, their studies have caused consternation with the realisation that fatigue is a ubiquitous symptom that is as difficult to define today as it was in 1921 when Muscio (p. 45) stated that "the term be absolutely banished from scientific discussion". Confusion surrounds the definition and use of the term fatigue, and it is frequently used interchangeably with others such as tiredness, lethargy and weakness (Bartley, 1976).

Although fatigue is a universally experienced phenomenon, no universal definition of fatigue exists (Nail and King, 1987).

The principal purpose of this concept analysis is to distinguish between the colloquial and the nursing uses of the term fatigue, and to identify the essential attributes that define the nursing concept. The review of the nursing literature is structured accordingly, with the first section identifying the parallels between the nursing and colloquial uses, and the second section presenting the differences between them.

Nursing uses which reflect the colloquial uses

Fatigue causing physical or mental weariness. Fatigue is a term that has been developed and used within a broad spectrum of health-related disciplines. This has resulted in the construction of diverse definitions according to the requirements of each domain. Physiologists, including Lewis and Haller (1991), usually refer to the poor physical performance displayed by fatigued individuals, resulting from the physical insufficiency imposed by fatigue. Pathologists generally view the physical and mental deficits associated with fatigue as indicators of neuromuscular or metabolic disorders (Hart and Freel, 1982). Whereas psychologists usually allude to the mental insufficiencies, including poor concentration, associated with fatigue. These definitions parallel those in the dictionaries by focusing on the physical and mental weakness that characterises fatigue. However, they also focus on select aspects of the phenomenon, rather than considering all of the impacts of fatigue on the fatigued individual.

Other definitions of fatigue, especially those developed by nurses, take a broader and more holistic view. Tack (1990), in her study of self-reported fatigue in rheumatoid arthritis patients, defined fatigue as "the subjective sensation of generalised tiredness or exhaustion". The term "generalised" alludes to the whole person being encompassed by the sensation of fatigue, rather than the feeling being restricted to specific anatomical structures, regions or functions. Likewise, Hubsky and Sears (1992) defined the generalised fatigue experienced by patients with multiple sclerosis as a "total body feeling and experience", and Appels and Mulder (1988) described the fatigue that is often experienced by people before they suffer a myocardial infarction as a sensation of excess fatigue and decreasing energy that is accompanied by feelings of dejection and defeat. These definitions are reflected in Piper's (1986) definition which is often quoted by scholars from medical disciplines when writing about this phenomenon. She defined fatigue as the perception of a complex interplay of both somatic and psychological factors.

Definitions that offer a concept of fatigue as a holistic experience, rather than as a phenomenon that solely affects either physical or mental performance, would seem to be more valuable and reflective of the fatigue that is experienced by ill individuals. These feelings are illustrated in the following extract, which is a quote taken from Schaefer's (1990) study in which one person described fatigue as:

"Fatigue means my whole being is tired. The tiredness penetrates the whole bone structure; you feel it in the very marrow of your bones. It is total physical tiredness, and on top of that is mental tiredness. It's like an undercurrent that undermines your thinking. Your body is wearing out. The weight of fatigue is in the shadows. If I rest, the fatigue will overwhelm me".

Fatigue as an unpleasant sensation. Fatigue is depicted in many research studies as one of the most distressing symptoms of illness (Rhodes *et al.*, 1988), and by implication the

experience is unpleasant. Researchers including Hart *et al.* (1990), Pickard-Holley (1991), and Rieger (1988), have described the experience as one of discomfort.

However, many definitions do not explicitly identify fatigue in the ill individual as an unpleasant experience, perhaps because many researchers take for granted that it is an odious and uncomfortable state. The paucity of qualitative research describing the feelings associated with fatigue (Potempa, 1993) may also be a contributory factor.

A review of the literature reveals that fatigue is frequently linked with demoralisation and depression (Appels and Mulder, 1988; Srivastava, 1989; Cardenas and Kutner, 1982), implying that fatigue and its symptoms are unpleasant. This is supported by the quote, presented above, from Schaefer's qualitative study.

Fatigue reducing individuals' ability to function. The medical and nursing definitions of fatigue, almost without exception, mirror the dictionary definitions with their reference to the decreased motor and mental skills that accompany fatigue. These functional deficits render an individual unable to function in a given situation (Srivastava, 1989) and affect an individual's ability to perform everyday tasks and to enjoy leisure activities (Todres and Wojtuik, 1979).

These decreased motor and mental skills are reflected in the North American Nursing Diagnosis Association's (NANDA's) criteria for a nursing diagnosis of "chronic fatigue". NANDA formally recognised the significance of chronic fatigue in 1988 (Potempa, 1993) and propose that fatigue is characterised by decreased concentration, poor task performance, decreased sexual activity and accident proneness (Carpentito, 1992).

Nursing uses which conflict with the colloquial uses

Fatigue as a temporary phenomenon caused by exertion

The fatigue which frequently accompanies illness is referred to as chronic fatigue in the medical and nursing literature. Chronic fatigue is induced by the disease process or the treatment regimen, rather than by activity. It usually has an insidious onset, is cumulative and persists over time. This type of fatigue is rarely dissipated by sleep, although it may be temporarily eased by rest, a change in activity or diversion (Hart and Freel, 1982). This relief is generally short term whilst the individual is compromised by disease. Chronic fatigue, as its name would suggest, is a persistent rather than a temporary phenomenon.

This is in contrast to the fatigue which most people encounter in their daily lives, and is reflected in the dictionary definitions of this concept. This fatigue is generally related to some identifiable form of exertion, is rapid in onset, short in duration and relieved by a good night's sleep. This temporary form of fatigue is referred to in the scientific literature as acute fatigue (McFarland, 1971; Piper, 1988).

Fatigue as a subjective phenomenon

Dictionary definitions do not mention the subjective nature of fatigue, whereas medical and nursing definitions frequently allude to the subjective nature of the symptom. Winningham *et al.* (1994), Nail and King (1987), Tack (1990), Krupp *et al.* (1989), Hubsky and Sears (1992), Chalder *et al.* (1993) and Srivastava (1989) are united in their view, and represent the majority opinion, that fatigue is experienced as a subjective and internal feeling that appears not to be the same for everyone. These researchers focused on patients

suffering from illnesses ranging from cancer to chronic fatigue syndrome and yet are united in their description of fatigue as a subjective sensation. This view is reflected in NANDAs criteria for chronic fatigue. This body proposes that a self-reported perceived lack of energy is the major feature of chronic fatigue.

Hence although fatigue is comprised of physical and psychological sensations, the experience is incomplete without an individual's evaluation of his feelings (Kellum, 1985). Subjective self-evaluation is the key component which determines how an individual perceives fatigue (Hart and Freel, 1990).

Similar concepts

Tiredness and weakness are the terms that are most frequently used synonymously with fatigue in the nursing literature. However, they should not be used interchangeably with fatigue because tiredness and weakness do have discrete properties.

Tiredness is a state in which a person feels a temporary lessening of strength and energy (Richardson, 1995). Whilst these feelings may be experienced as part of fatigue (Pickard-Holley, 1991), the latter is a complex concept with additional characteristics. Furthermore, Grandjean (1970) proposed that fatigue may incorporate feelings ranging from tiredness at one end of a continuum to exhaustion at the other. Hence, whilst tiredness can provide an indication of fatigue, it is not synonymous with it.

Weakness is a symptom that is produced by neurological impairment and, like fatigue, affects an individual's ability to perform tasks. However, fatigue does have a voluntary aspect and individuals can, by virtue of will power and through pacing themselves, perform certain activities (Rhodes *et al.*, 1988). Whereas, weakness has no voluntary aspect in the performance of activities (Pickard-Holley, 1991; Nail and King, 1987) and cannot be abated by will power.

Defining attributes

Defining attributes are those "characteristics of a concept which appear over and over again" when the concept is defined or described (Walker and Avant, 1995). Analysis of fatigue has revealed that it is a multidimensional and complex concept which possesses different attributes according to the context in which it is used. However, from the nursing and medical literature four critical attributes are evident. Fatigue is:

1. a total body feeling and experience, encompassing physical, cognitive and emotional dimensions;
2. an odious and unpleasant experience which causes distress;
3. a chronic and unrelenting phenomenon;
4. a subjective experience dependent upon an individual's perceptions.

Constructed cases

Constructed cases aid the understanding of a concept by providing examples that illustrate a model case, and other borderline, related, and contrary cases (Walker and Avant, 1995).

Model case

A model case is a “real life” example of the concept and contains all of the critical attributes and no attributes of any other concept (Walker and Avant, 1995).

It was a beautiful day the artist thought, sunny, even balmy, the kind of day that normally inspired him to paint some of his most creative works. However, instead of working on his latest masterpiece, he sat dejectedly and reflected upon his health. He had felt unwell for the past month, since his tonsillitis in the Spring. Yet it was difficult to pinpoint exactly what was amiss. Exhaustion, utter exhaustion, he thought. It was difficult enough to conjure up the energy and motivation to get out of bed in the morning let alone the energy to fire up some creative inspiration. It was certainly distressing him and perhaps, he reflected, his agent was right, he was depressed. All most unlike him.

This is a model example demonstrating fatigue. All of the critical attributes are embodied in the artist’s experience. He feels totally overwhelmed by his symptoms which are affecting not only his physical abilities but also his psyche. He perceives the experience as both unpleasant and unrelenting.

Borderline case

A borderline case contains some, but not all, of the critical attributes of the concept. The inconsistency of the borderline case demonstrates the perfection of the model case and clarifies the qualities of the defining attributes (Walker and Avant, 1995).

Afternoon tea at Hollering Hall was always a frantic affair, thought the elderly and somewhat decrepit butler. Ever since the argument over the inheritance the three ladies had refused to take tea together. First, Earl Grey Tea to be taken to Lady Penelope in the conservatory. Then camomile tea, with a sliver of angel cake, to be served to Lady Gabriella, four flights of stairs and one hundred and twenty-three steps above in the library. Before taking peppermint tea and a ‘wee whiskey’ to Lady India in the Burmese Room. The tea trail always took it out of him he reflected, never a day passed when his legs did not ache as a result. Thank heavens afterwards he could put his feet up and take forty winks. He marvelled at the restorative beauty of sleep.

Related case

A related case is an example of a similar and related concept to the one being studied, but does not contain the critical attributes.

The young girl clambered out of bed. Her legs were weak and she stumbled onto the chair nearby. If she had not done so she would have fallen because her legs had already started to buckle beneath her.

This is an example of the concept of weakness, a related concept which is similar in some respects to fatigue, but which does not have the same defining attributes.

Contrary case

A contrary case presents a scenario that is clearly not an example of the concept being investigated (Walker and Avant, 1995). This illustrates the differences between the concept being analysed and the contrary case and clarifies the attributes that have been identified.

The whole family agreed, Tom was like a new man following his hip replacement three weeks ago. He walked with a spring in his step and had so much vitality and zest for life. He seemed on top of the world.

In this scenario Tom has none of the critical attributes that comprise fatigue. Whatever ‘fatigue’ is, this clearly is not an example of the concept.

Antecedents and consequences

The identification of antecedents and consequences helps to refine the critical attributes and elucidate the contexts in which the concept is generally used (Walker and Avant, 1995). Antecedents are factors that must be present before the occurrence of the concept whereas consequences are events that occur as a result of the concept.

Antecedents

In a medical context, where interest centres around chronic fatigue, there are two antecedents which are necessary for the occurrence of fatigue. Firstly, either a pathological physical or psychological condition must prevail. Secondly, individuals have to be conscious and cognitively able to evaluate their feelings subjectively.

Consequences

Fatigue is a phenomenon that affects both physical and mental abilities with consequences for an individual's routine functioning (Hart *et al.*, 1990). Everyday activities including going to work, performing household tasks, engaging in social or leisure activities and performing daily self-care activities such as bathing and dressing, may be impeded or even curtailed (Nixon and Bethell, 1974; Hubsby and Sears, 1992).

Fatigue commonly precipitates affective, behavioural and cognitive responses. These include irritability, impaired thought processes, inability to make decisions, inability to concentrate on daily tasks, inability to cope, forgetfulness, poor motivation and family conflict (Hubsby and Sears, 1992; Nail and King, 1987; Voith *et al.*, 1989). These physical and mental factors have an effect upon individuals' overall quality of life.

Variables which have been identified as aggravating fatigue include, medications and treatment, over exertion, sleep quality and quantity, emotional stresses, environmental factors, lack of social support, age, nutritional status, and disease activity (Tack, 1990).

Empirical referents

Walker and Avant (1995) propose that empirical referents, i.e. the occurrence of actual phenomena, provide evidence of the concept itself. These can then supply the clinician with clear and observable phenomena by which to 'diagnose' the existence of the concept.

Researchers have attempted to diagnose and measure fatigue by assessing observable phenomena, for example individuals' physical ability, as proposed by Walker and Avant (1995). Physical strength has been evaluated by methods such as measuring walking time and grip strength (Crosby, 1991). However, objective measurements have been viewed by many as inappropriate due to the multidimensionality of the phenomenon, and its subjective nature. Furthermore, Crosby (1991) stressed that the objective and subjective indicators may not be highly correlated. Thus, the health care provider's perception of a patient's tiredness may not accurately reflect the individual's experiences.

The multidimensional quality of fatigue makes the phenomenon difficult to isolate and measure. Researchers have identified a number of different dimensions associated with fatigue, Piper *et al.* (1989) have identified four dimensions. However, these may have different significance not only amongst fatigued individuals, but also the dynamic nature of fatigue may mean that fatigue will vary for the same individual from one day to the next.

Self-report instruments which measure individuals' subjective perception of their fatigue are key to the understanding of this phenomenon (Piper *et al.*, 1989). There are several instruments that measure subjective fatigue most notably the Pearson and Byars Fatigue Symptom Checklist (Pearson, 1957), the Symptom Distress Scale (McCorkle and Young, 1978) and the Profile of Mood States (McNair *et al.*, 1971). However, the Pearson and Byars instrument was developed for use with healthy populations, and its relevance for use with ill individuals with chronic rather than acute fatigue, has been questioned (Piper *et al.*, 1989). The Symptom Distress Scale and the Profile of Mood States were developed to measure phenomena other than fatigue and incorporated the measurement of subjective fatigue, however, their use is limited because they do not capture the multidimensional nature of fatigue. Finally, the Piper Fatigue Scale (Piper *et al.*, 1989) has been developed specifically to measure subjective fatigue in ill individual's. This self-report instrument measures multidimensional aspects of fatigue but is lengthy and impractical for regular or repeated administration (Chalder, 1993).

Assessments of fatigue have taken various forms, ranging from objective measurements to subjective self-report assessments, and incorporating varying dimensions of fatigue. This inconsistency will probably continue until the phenomenon of fatigue is clearly delineated and understood, but this concept analysis would suggest that subjective measures of fatigue, rather than objective ones, would be more appropriate.

A definition of fatigue

This concept analysis has identified that colloquial definitions of fatigue are different from scientific ones. A clarified definition for nursing usage, based on this concept analysis, is proposed below.

Fatigue is a subjective, unpleasant symptom which incorporates total body feelings ranging from tiredness to exhaustion creating an unrelenting overall condition which interferes with individuals' ability to function to their normal capacity.

Conclusion

Some of the ambiguities associated with fatigue have been identified through this concept analysis. Most notably those that have arisen following its dual use within colloquial and scientific contexts. Furthermore, by following the process advocated by Walker and Avant (1995) a definition of fatigue for nursing usage has been proposed.

The saliency of this definition for clinical populations has yet to be determined. Further research is necessary to explore the meaning of fatigue for individuals experiencing a cross-section of illnesses. The researcher is currently performing a phenomenological analysis of the fatigue experienced by patients with cancer and chronic lung diseases. The findings from the phenomenological investigation shall be compared with those from this concept analysis.

Clarification of fatigue is fundamental for the development of fatigue theories. The latter have been hampered to date by inconsistencies in the conception and definition of fatigue (Winningham, 1994). Furthermore, instruments used to measure and describe fatigue reflect this conceptual confusion. Instruments have purported to measure concepts including fatigue, weakness, energy depletion and functional impairment. The sufficiency of existing

instruments used to measure and describe fatigue need to be evaluated because instruments should accurately reflect a concept's defining attributes (Walker and Avant, 1995).

In addition this clarification of fatigue will have implications for clinical nursing practice. Once nurses are able to understand the phenomenon of fatigue they will be able to develop effective nursing interventions to enable patients to manage their fatigue effectively.

References

- Aistairs, J. (1987). Fatigue in the cancer patient: a conceptual approach to a clinical problem. *Oncol. Nurs. Forum* **14**(6), 25–30.
- Appels, A. and Mulder, P. (1988). Excess fatigue as a precursor of myocardial infarction. *Eur. Heart J.* **9**, 758–764.
- Bartley, S. (1976). What do we call fatigue? In *Psychological Aspects and Physiological Correlates of Work and Fatigue* (Simonson, E. and Weiser, P., Eds), pp. 409–414. Charles C. Thomas, Springfield, Illinois.
- Cameron, C. (1973). A theory of fatigue. *Ergonomics* **16**(5), 633–648.
- Cardenas, D. and Kutner, N. (1982). The problem of fatigue in dialysis patients. *Nephron* **30**, 336–340.
- Carpentito, L. (1992). *Nursing Diagnosis: Applications for Clinical Practice*. J. B. Lippincott Co., Philadelphia.
- Chalder, T., Berelowitz, G., Pawlikowska, T., Watts, L., Wessely, S., Wright, D. and Wallace, E. P. (1993). Development of a fatigue scale. *J. Psychosom. Res.* **37**(2), 147–153.
- Collins English Dictionary* (1979). William Collins and Sons Co. Ltd., Glasgow, London.
- Crosby, L. J. (1991). Factors which contribute to fatigue associated with rheumatoid arthritis. *J. Adv. Nurs.* **16**, 974–981.
- Davis, C. (1948). Interferon-induced fatigue. (Abstract No. 72). *Oncol. Nurs. Forum*, 11(Suppl.)
- Grandjean, E. (1970). Fatigue. *Am. Indust. Hygiene Assoc. J.* **31**, 401–411.
- Hart, L. (1978). Fatigue in the patient with multiple sclerosis. *Res. Nurs. Health* **1**(4), 147–157.
- Hart, L. and Freel, M. (1982). Fatigue. In *Concept Clarification in Nursing* (Norris, C., Ed.). Aspen, London.
- Hart, L., Freel, M. and Milde, F. (1990). Fatigue. *Nurs. Clin. N. Am.* **25**(4), 967–975.
- Haylock, P. and Hart, L. (1979). Fatigue in patients receiving localised radiation. *Cancer Nurs.* **2**, 461–467.
- Hubsy, E. P. and Sears, J. N. (1992). Fatigue in multiple sclerosis: guidelines for nursing care. *Rehabil. Nurs.* **17**(4), 176–180.
- Kellum, M. D. (1985). Fatigue. In *Signs and Symptoms in Nursing. Interpretation and Management* (Jacobs, M. and Geels, W., Eds). J. B. Lippincott Co., Philadelphia.
- Krupp, L., Alvarez, L., LaRocca, N. and Scheinberg, L. (1988). Fatigue in multiple sclerosis. *Archs Neurol.* **45**(April), 435–437.
- Krupp, L., Alvarez, L., LaRocca, N. and Scheinberg, L. (1989). The fatigue severity scale. Application to patients with multiple sclerosis and systemic lupus erythematosus. *Archs Neurol.* **46**(Oct), 1121–1123.
- Lewis, S. F. and Haller, R. G. (1991). Physiologic measurement of exercise and fatigue with special reference to chronic fatigue syndrome. *Rev. Infect. Dis.* **13**, S98–S108.
- McFarland, R. A. (1971). Understanding fatigue in modern life. *Ergonomics* **14**(1), 1–10.
- McCorkle, R. and Young, K. (1978). Development of a symptom distress scale. *Cancer Nurs.* **1**(5), 373–377.
- McNair, D., Lorr, M. and Droppleman, L. (1971). *Profile of Mood States*. Education and Industrial Testing Service, San Diego.
- Mosby's Dictionary of Medical, Nursing and Allied Health* (1990). 3rd Edn. C.V. Mosby, St Louis.
- Muscio, B. (1921). Is a fatigue test possible? *Br. J. Psychol.* **12**, 31–46.
- Nail, L. M. and King, K. B. (1987). Fatigue. *Seminars Oncol. Nurs.* **3**(4), 257–262.
- Nixon, P. G. and Bethell, H. J. (1974). Preinfarction ill health. *Am. J. Cardiol.* **33**, 446–449.
- Norris, C. (1982). *Concept Clarification in Nursing*. Aspen, London.
- Pearson, R. G. (1957). Scale analysis of a fatigue checklist. *J. Appl. Psychol.* **41**(3), 186–191.
- Pickard-Holley, S. (1991). Fatigue in cancer patients—a descriptive study. *Cancer Nurs.* **14**(1), 13–19.
- Piper, B. (1986). Fatigue. In *Pathophysiological Phenomena in Nursing: Human Response to Illness*, pp. 219–234. W.B. Saunders, Philadelphia.
- Piper, B. (1988). Fatigue in cancer patients: current perspectives on measurement and management. In *Nursing Management of Common Problems*, from the 5th National Conference on Cancer Nursing, American Cancer Society, USA.
- Piper, B., Lindsey, A., Dodd, M., Ferketich, S., Paul, S. and Waller, S. (1989). The development of an instrument to measure the subjective dimension of fatigue. In *Key Aspects of Comfort* (Funk, S., Tornquist, E., Champagne, M., Copp, L. and Wiese, R., Eds). Springer Publishing Company, New York.
- Potempa, K. (1993). Chronic fatigue. In *Annual Review Of Nursing Research*, 11 (Fitzpatrick, J. and Stevenson, J., Eds). Springer, New York.

- Rhodes, V., Watson, P. and Hanson, B. (1988). Patients' descriptions of the influence of tiredness and weakness on self-care abilities. *Cancer Nurs.* **11**, 186–194.
- Rieger, P. (1987). Interferon-induced fatigue: A study of fatigue measurement (Abstract A163). *Sigma Theta Tau International 29th Biennial Convention Book of Proceedings*.
- Rieger, P. (1988). Management of cancer-related fatigue. *Dimens. Oncol. Nurs.* **11**(3), 5–8.
- Richardson, A. (1995). Patterns of fatigue in patients receiving chemotherapy. Unpublished doctoral thesis, King's College London.
- Roget's International Thesaurus* (1988). 4th Edn. William Collins and Sons Co. Ltd., Glasgow, London.
- Schaefer, K. (1990). A description of fatigue associated with congestive heart failure: use of Levine's conservation model. In *Nursing Theories in Practice* (Parker, M.E., Ed.), pp. 217–236. National League for Nursing.
- Schwartz-Barcott, D. and Kim, H.S. (1986). A hybrid model for concept development. In *Nursing Research Methodology* (Chill, P. L., Ed.). Aspen, London.
- Srivastava, R. (1989). Fatigue in end-stage renal disease patients. In *Key Aspects of Comfort* (Funk, S., Tornquist, E., Champagne, M., Copp, L. and Wiese, R., Eds). Springer Publishing Company, New York.
- Straus, S. (1991). History of chronic fatigue syndrome. *Rev. Infect. Dis.* **13**(Suppl. 1), S2–S7.
- Tack, B. (1990). Self-reported fatigue in rheumatoid arthritis—a pilot study. *Arthritis Care Res.* **3**(3), 154–157.
- The Oxford Dictionary of English Etymology* (1966). Oxford University Press, London.
- The Oxford English Dictionary* (1989). 2nd Edn, Vol. V. Clarendon Press, Oxford.
- Todres, R. and Wojtuik, R. (1979). The cancer patient's view of chemotherapy. *Cancer Nurs.* **2**(4), 283–286.
- Voith, A., Frank, A. and Pegg, J. (1989). Nursing diagnosis: fatigue. In *Classification of Nursing Diagnosis*, proceedings of the 8th conference, pp. 453–458.
- Walker, L. and Avant, K. (1995). *Strategies for Theory Construction in Nursing*, 3rd Edn. Appleton Lange, London.
- Winningham, M.L. (1994). Fatigue and the cancer experience: the state of the knowledge. *Oncol. Nurs. Forum* **21**(1), 23–36.
- Yoshitake, H. (1971). Three characteristic patterns of subjective fatigue symptoms. *Ergonomics* **21**(3), 231–233.

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