Usage analysis of dermatological products according to a medicine claims database.

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ABSTRACT

Title: Usage analysis of dermatological products according to a medicine claims database.

Keywords: Dermatology, drug utilisation review, prevalence, medicinal treatment cost.

A large number of people all over the world suffer from skin conditions. Dermatological problems comprise about 10 % of a general practitioner's caseload and probably more for pharmacists. The literature furthermore emphasises that skin diseases are becoming a significant problem in the developing world. There is a need to establish an effective method to achieve good health and quality of life for patients with dermatological problems.

The general objective of this study was to investigate the usage patterns and cost of dermatological products in the private health care sector of South Africa by using a medicine claims database. The focus was specifically on dermatological products with a prevalence of more than 10 % in the database.

A quantitative retrospective drug utilisation research design was used to evaluate the usage patterns and costs of dermatological products in three four-monthly intervals of 2001 and 2004. Data were analysed by using the Statistical Analysis System, 9.1 (SAS). The dermatological product groups for this study were antibacterial and antifungal drugs, corticosteroids and anti-acne products and were analysed according to the MIMS® classification.

Of all analysed prescriptions issued only 8.57 % (n = 126 447) during 2001 (N = 1 475 380) and 6.82 % (n = 177 122) during 2004 (N = 2 595 254) consisted of dermatological products. Of the total number of products prescribed, the dermatological products constituted 4.77 % (n = 140 701) for 2001 (N = 2 951 326) and 3.77 % (n = 199 976) for 2004 (N = 5 305 882). The total cost of the dermatological products was 4.98 % (n = R18 913 889.92) of the total cost of all medicine products during 2001 (N = R379 708 489). During 2004 (N = R661 223 146) the total cost of dermatological products was 4.09 % (n = R27 025 540.48) of the total cost of all medicine products in the database. The cost-prevalence index for 2001 and 2004 respectively showed that the dermatological products were relatively expensive with values of 1.03 and 1.09.

The antibacterial and antifungal drugs, corticosteroids and anti-acne products represented 91.92 % (n = 129 336) and 87.97 % (n = 175 916) of all dermatological products during 2001 (N = 140

701) and 2004 (N = 199 976), respectively. These dermatological groups named above represented 91.57 % (n = R17 319 645.61) and 85.85 % (n = R23 200 594.71), respectively, of the total cost of dermatological products during 2001 (N = R18 913 889.92) and 2004 (N = R27 025 540.48).

It was further found that the majority of dermatological products prescribed during the research periods was innovator products. The prevalence of innovator products for 2001 was 86.17 % (n = 121 249) with a total cost representing 94.16 % (n = R17 809 603.12). For 2004 the prevalence was 82.33 % (n = 164 640) with a total cost representing 91.01 % (n = R24 594 923.72) of all the dermatological products prescribed. The number of innovator and generic products claimed during 2001 amounted to 86.17 % (n = 121 249) and 13.83 % (n = 19 452) respectively of the total number of products claimed (N = 140 701). During 2004 the number of innovator and generic products represented respectively 82.33 % (n = 164 640) and 17.67 % (n = 35 336) of the total number of products claimed (N = 199 976).

The prevalence in the use of the dermatological products during 2004 increased with 55.25 % from January to April versus September to December. The cost-prevalence index indicated that the dermatological products were relatively expensive during January to August 2004. During September to December 2004 the cost-prevalence decreased and indicated that dermatological products became inexpensive.

The average cost of dermatological products during the 2004 study period showed that the cost decreased. January to April (before implementation of the new single exit price structure) was compared to September to December (after implementation of the new single exit price structure). This comparison indicated that the average cost decreased by 22.88 %.

It can be summarised that the average cost in the last study period decreased due to the changed price structure. The innovator products' prevalence was high and therefore more generics are needed in dermatology. If more generics are used the total cost of dermatological products might also decrease. The number of dermatological prescriptions increased towards 2004, but this may be because of more members or more medical aids claiming through this database.

OPSOMMING

Titel: Gebruiksontledings van dermatologiese produkte volgens 'n databasis van medisyne-eise.

Sleutelwoorde: Dermatologie, medisyneverbruiksevalueuring, voorkoms, koste van behandeling met medisyne.

'n Groot aantal mense reg oor die wêreld ly aan veltoestande. Dermatologiese probleme bedra ongeveer 10 % van die algemene praktisyn se werkslading en moontlik meer van dié apteker. Die literatuur toon dat dermatologiese probleme 'n beduidende probleem in die derde wêreld word. Daar bestaan 'n behoefte aan 'n effektiewe metode om goeie gesondheid en lewenskwaliteit vir pasiënte met dermatologiese probleme te verseker.

Die algemene doel van hierdie studie was om ondersoek in te stel na die gebruikspatrone en koste van dermatologiese produkte in die privaat gesondheidsektor van Suid-Afrika deur 'n databasis van medisyne-eise te gebruik . Daar is spesifiek gefokus op dermatologiese produkte met 'n voorkoms van meer as 10 % in die databasis.

'n Kwantitatiewe navorsingontwerp van retrospektiewe medisyneverbruiksevaluering is gebruik om verbruikspatrone en koste van dermatologiese produkte in viermaandelikse intervalle vir 2001 en 2004 te evalueer. Die data is uit 'n sentrale databasis onttrek en met behulp van SAS (Statistical Analysis System, 9.1) ontleed. Die groepe dermatologiese produkte vir die studie was antibakteriële en antifungusmiddels, kortikosteroïde en die anti-akneeprodukte volgens die klassifikasiestelsel van MIMS®.

Van al die geanaliseerde voorskrifte (N = 1 475 380) het 8.57 % (n = 126 477) in 2001 en 6.82 % (n = 177 122) in 2004 dermatologiese produkte bevat. Van die totale aantal produkte voorgeskryf (N = 8 257 207) verteenwoordig dermatologiese produkte 4.77 % (n = 140 701) vir 2001 en 3.77 % (n = 199 976) vir 2004. Die totale koste van dermatologiese produkte verteenwoording 4.98 % (n = R18 913 889.92) van die totale koste van alle medisyne gedurende 2001 (N = R379 708 489). Gedurende 2004 (N = R661 223 146) was die totale koste van dermatologiese produkte 4.09 % (n = R27 025 540.48) van totale koste van alle medisyne op die databasis. Die koste-voorkomsindeks vir 2001 en 2004 was 1.03 en 1.09 onderskeidelik wat aandui dat dit relatiewe duur produkte was.

Die antibakteriële en antifungusmiddels, kortikosteroïde en anti-akneeprodukte het onderskeidelik 91.92 % (n = 129 336) en 87.97 % (n = 175 916) van alle dermatologiese produkte gedurende 2001 (N = 140 701) en 2004 (N = 199 976) verteenwoordig. Hierdie genoemde dermatologiese groepe het onderskeidelik 91.57 % (n = R17 319 645.61) en 85.85 % (n = R23 200 594.71) van die totale koste van dermatologiese produkte vir 2001 (N = R18 913 889.92) en 2004 (N = R27 025 540.48) verteenwoordig.

Daar is verder gevind dat die meerderheid van dermatologiese produkte wat tydens die studieperiodes geëis was oorspronklike produkte was. Die voorkoms van die oorspronklike produkte gedurende 2001 was 86.17 % (n = 121 249) met 'n totale koste van R17 809 603.12 (94.16 %). Vir 2004 was die voorkoms 82.33 % (n = 164 640) met totale koste van R24 594 923.72 (91.01 %) van alle voorgeskrewe dermatologiese produkte. Die aantal oorspronklike en generiese produkte wat in 2001 geëis is, was 86.17 % (n = 121 249) en 13.83 % (n = 19 452) onderskeidelik vir die totale aantal produkte (N = 140 701). Tydens 2004 (N = 199 976) was die aantal oorspronklike en generiese produkte 82.33 % (n = 164 640) en 17.67 % (n = 35 336) onderskeidelik van die totale aantal dermatologiese produkte (N = 199 976).

Die gebruik van dermatologiese produkte in 2004 was 55.25 % hoër in die tydperk Januarie tot April vergeleke met September tot Desember. Die koste-voorkomsindeks dui daarop dat dermatologiese produkte gedurende Januarie tot April 2004 en Mei tot Augustus 2004 relatief duur was. Tydens September tot Desember het die koste-voorkomsindeks afgeneem en dui daarop dat dermatologiese produkte goedkoper geword het.

Die gemiddelde koste van dermatologiese produkte in die studietydperk van 2004 het aangedui dat die koste verlaag het. Januarie tot April 2004 (voor implementering van die enkele uitgangsprys) is met September tot Desember 2004 (na implementering) vergelyk. Daar is gevind dat die gemiddelde koste met 22.88 % gedaal het.

Ter opsomming kan gemeld word dat die gemiddelde koste in die laaste studieperiode met die veranderde prysstruktuur afgeneem het. Die gebruik van oorspronklike produkte was hoog en dus word meer generiese produkte in dermatologie benodig. As meer generiese produkte gebruik word, kan die totale koste van dermatologiese produkte moontlik verlaag. Die aantal dermatologiese voorskrifte het toegeneem in 2004, maar dit mag wees as gevolg van meer lede of meer mediese fondse wat deur die databasis eis.

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CHAPTER 1
INTRODUCTION

A large number of people all over the world suffer from skin problems. A person's skin is a very obvious part of his or her body and when looking at the person it would be one of the first things to be noticed. For this reason people are usually very sensitive about the condition of their skins.

1.1. PROBLEM STATEMENT

The economic aspects of medical interventions are becoming increasingly important and today's societies are not willing to pay for all aspects of medical care (Ellis *et al.*, 2002:271). The rising cost of health care is a worldwide problem that needs to be controlled (Dehkharghani *et al.*, 2003:592). In the long run a lower educational level and lower income as well as housing problems have an influence on a patient's recovery from skin problems (Jessop *et al.*, 2002:568). According to MacKie (1997:3) skin diseases in the UK have increased dramatically and this may lead to economic implications for some patients.

There is a need to establish an effective method to achieve good health and quality of life for patients with skin problems (Jessop *et al.*, 2002:568). Dehkharghani *et al.* (2003:592) mentioned that the impact of skin diseases in the USA is a great burden to the nation in terms of morbidity and expenses incurred.

Jobanputra and Bachmann (2000:826) also emphasised that skin diseases are becoming a significant problem in the developing world. The most common diseases treated in terms of skin problems are atopic dermatitis, psoriasis and other forms of dermatitis and drug reactions. According to Jessop *et al.* (2002:568) these diseases are frequently a reason for admission to a dermatology unit in Cape Town.

Skin diseases can affect the quality of life of patients (Jobanputra & Bachmann, 2000:826). The skin is the largest organ of the body and must endure and absorb a variety of factors every day, e.g. UV rays, skin products and even drugs. The skin has many functions, for example

- protection;

- thermoregulation;
- immune responsiveness; and
- sensory perception (Wyatt *et al.*, 2001:1795).

The first step in treating a patient presenting with skin problems is to investigate the patient's medical history, with special emphasis on any problems that could lead to a specific dermatological problem. An examination of the whole body must be done and one must look out for characteristic lesions caused by specific skin diseases (Berger, 2003:81).

For the purposes of this study the pharmacological classification of the dermatological agents according to the MIMS® was used and the classification included the following (MIMS, 2005:11a):

- Antibacterial antiseptic agents
- Antiparasitic
- Fungicides
- Cortico-steroids
    - Cortico-steroids with anti-infective agents
- Psoriasis and acne
- Melanin inhibitors and stimulants
- Emollients and protectives
- Others (MIMS, 2005:11a).

The research questions for this study were:

- How can dermatological diseases be treated with the four categories of dermatological medicines that were chosen for this study?
- What are the prevalence and costs of dermatological products in the private health care sector of South Africa?

- Which methods of managed health care aspects are used?
- What are the prevalence and costs of innovator and generic medicines?
- Does combination therapy occur in dermatology and what are the costs?
- What recommendations can be made in the management of dermatology?

1.2. GENERAL OBJECTIVE

The general objective of this study was to investigate the usage patterns and costs of dermatological products in the private health care sector of South Africa according to a medicine claims database, with special reference to those products with a prevalence of more than 10 % on the database.

1.3. SPECIFIC RESEARCH OBJECTIVES

The specific research objectives included the following:

1.3.1. Literature objectives

The literature study served the purpose of reviewing the necessary information relating to the study to be undertaken. The specific research objectives of the literature study were as follows:

- To present a brief overview of the anatomy of the skin.
- To describe nail abnormalities and pruritus as dermatological problems.
- To describe from the literature the different dermatological diseases that account for more than 10% of all dermatological products on the medicine claims database, while at the same time referring to their treatments.
- To briefly look at the relationships between the different health care concepts.
- To define the essence of managed health care.
- To present a brief description of disease management, case management, outcomes management and component management.
- To investigate what the South African perspective of managed health care is.
- To state briefly what pharmaceutical care entails.

- To mention briefly to what the concept of drug utilisation review refers.
- To describe what evidence based medicine is.
- To describe pharmaco-epidemiology.
- To discuss the essence of pharmaco-economics.

1.3.2. Empirical objectives

The specific research objectives of the empirical study were the following:

- To determine the usage patterns and costs of the dermatological products in the private health care sector of South Africa.
- To determine the cost of the dermatological products according to the new single exit price structure that came into effect on the 2nd of May 2004 and what cost savings there had been.
- To determine the prevalence and costs associated with innovator and generic equivalents of dermatological products mentioned in this study.
- To investigate the prevalence and costs of combination therapy in dermatology.
- To formulate recommendations with regard to the medicine management of dermatological diseases.

1.4. RESEARCH METHODS

A retrospective drug utilisation study was done on dermatological products of a medicine claims database for the years 2001 and 2004. The data obtained from the medicine claims database were divided into three four-month intervals (January to April, May to August and September to December). The statistical analysis of the data was done with the SAS 9.1.® Computer package (SAS institute Inc, 2004). The year 2001 was chosen because it was regarded as a stable time in the cost of medicine products. The 2004 study periods were selected because the new single exit price was implemented on the 2nd of May 2004. This had an effect on the costs of medicines. A literature study was also done with regard to relevant literature from journals, textbooks and other sources, like the Internet.

The research study was divided into two phases, *i.e.* the literature phase and the research phase.

1.4.1. **Phase one:** Literature review

The review has been divided into two chapters. The first chapter deals with the different dermatological diseases that are relevant to this study. These diseases are discussed under the following headings: etiology, clinical presentation and treatment of the condition.

The second chapter consists of the managed health care concepts relevant to this study and include pharmaceutical care and disease management concepts. The disease management is further described under the following headings: pharmaco-economics, retrospective drug utilisation review, pharmaco-epidemiology and evidence based medicine as well as the relevant principles.

1.4.2. **Phase two:** Empirical investigation

The empirical investigation consisted of the following steps:

- Research design – which is the backbone of the study and outlines what has been selected to be studied. The focus of this study was the dermatological products with a prevalence of more than 10% as described in chapter 5.
- Selection of research instrument(s) – the research instruments included the medicine items that had been used, the medicine usage patterns and medicine costs. An overview of the dermatological products' prevalence, usage patterns and the costs of these products is provided (See paragraph 4.3.2.3.).
- Analysis of data – this section was completed with the assistance of statistical methods. The statistical concepts were utilised to analyse the data according to the measuring instruments.
- Reliability and validity – the information was extracted directly from the medicine claims database and was believed to be correct and precise.
- Discussion based on findings in the empirical study – this is done in chapter 5.
- Conclusion and recommendations based on the results of the empirical investigation – these are outlined in chapter 6.

The data of this study were extracted from the medical claims database for the years 2001 and 2004, and the data obtained were divided into three four-month intervals for each of the years.

1.5. THE OUTLAY OF THE CHAPTERS

CHAPTER 1: INTRODUCTION

CHAPTER 2: DERMATOLOGICAL DISEASES

CHAPTER 3: ASPECTS OF MANAGED HEALTH CARE

CHAPTER 4: METHOD OF RESEARCH

CHAPTER 5: RESULTS AND DISCUSSION

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

1.6. CHAPTER SUMMARY

In this chapter a basic plan of how the study was conducted has been outlined. Firstly the relevant information gained by the literature study is discussed under chapter two and chapter three. A discussion of the methods, results and other aspects of the empirical study follows in chapters four to six. The arrangement of chapters has also been indicated. In the next chapter the relevant dermatological diseases are being described.

CHAPTER 2
DERMATOLOGICAL DISEASES

This chapter consists of a description of different skin diseases that have a prevalence of more than 10% of drug treatments categorised as corticosteroids, antibacterial, antifungal and anti-acne that are claimed on the medical claims database.

2.1. ANATOMY

The skin is the ultimate vessel of the body; it receives and transports, accepts and expels according to the body's needs (Dermatology channel, 2005a). The skin is the largest organ in the body (Hunter *et al.*, 1995:5). It covers the entire external surface of the human body and serves as a protective barrier preventing internal tissues to be exposed to trauma (Revis & Seagel, 2003). The skin is only about 2 mm thick and each human being has about two square metres of skin and weighs about 2.7 kg (Enchanted learning, 2005).

The skin's barrier function is accompanied, entirely and quite remarkably, by the outermost few microns of the skin – the *stratum corneum*, a compositionally and morphologically unique bio membrane. It composes of two main tissue layers, the dermis and the epidermis and these layers are being supported by a subcutaneous layers of fat, the hypodermis (Hunter *et al.*, 1995:6).

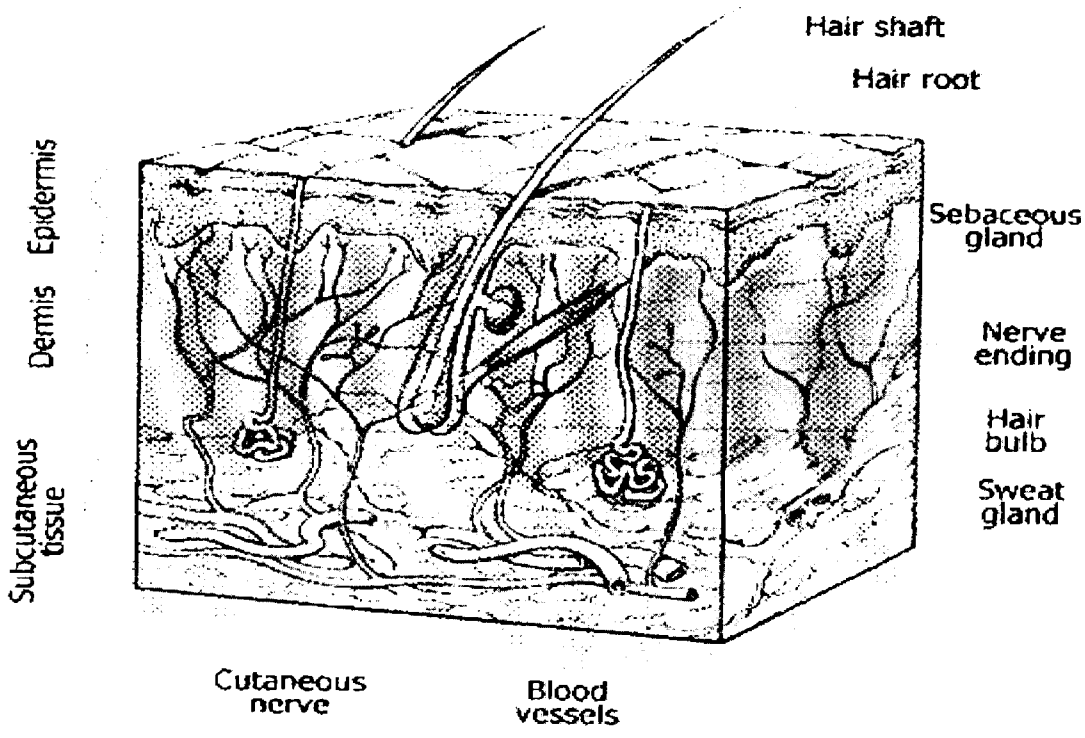

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Figure 2.1: Skin structure (American medical association, 2004).

2.1.1. EPIDERMIS

The epidermis is the outermost layer of the skin; it is thin but complex (Dermatology channel, 2005a). The epidermis is divided into four layers: the basal cell layer, the *stratum spinosum*, *stratum granulosum* and the *stratum corneum* (Choi, 2002; Longe & Calvert, 1999; Revis & Seagel, 2003).

The epidermis contains no blood vessels and depends entirely on the dermis for nutrients and the removal of waste (Revis & Seagel, 2003).

The *stratum corneum* is a complex combination of cells and consists of different layers. The cells of the *stratum corneum* are the largest and most abundant of the epidermis (Revis& Seagel, 2003). This layer is thicker in the palm and sole areas (Choi, 2002). The *stratum corneum* is the main element of the skin's permeation barrier. These layers protect the body against environment and limit the loss of fluids and electrolytes (Longe & Calvert, 1999). The *stratum corneum* is under continuous formation (Roy *et al.*, 1994:1723).

These extra cellular membranous sheets are devoid of phospholipids and are made up of ceramides, free fatty acids, cholesteryl sulphate and several minor constituents (Abraham & Downing, 1990:111).

The uppermost layer of the epidermis is made of tightly-packed layers of dead cells filled with keratin that forms a major physical barrier for the skin (Choi, 2002 ; Longe & Calvert, 1999).

The cells of the *stratum granulosum* are flattened and contain dark granules that are expelled and provide the strength that holds the cells together in the underlying stratum corneum (Choi, 2002).

The *stratum spinosum* lies above the basal cell layer and it is made of keratinocytes, cells that make protein keratin (Choi, 2002). The keratinocytes divide, differentiate and then move from the deeper layers to the superficial layers. The keratinocytes are totally differentiated when they reach the *stratum corneum* (Revis & Seagel, 2003). The keratin that forms is an important component of the *stratum corneum* as well as the nails and hair (Choi, 2002).

The basal cell layer's cells divide and differentiate into other cells in the epidermis and melanocytes; the cells make melanin (Choi, 2002). The melanin is responsible for the pigmentation of the skin and is distributed throughout the epidermis (Choi, 2002; Dermatology channel, 2005a). The epidermis keratinises to produce nails, hair and to regenerate. Keratinisation is the migration and maturation of skin cells, it begins in the innermost layer of the epidermis and moves outwards until it becomes horny (Dermatology channel, 2005a).

2.1.2. DERMIS

The dermis is the second and larger layer of the skin (Dermatology channel, 2005a). The dermis is a nondescript region lying between the epidermis and the subcutaneous and fatty region. The dermis separates epidermis from the hypodermis (Longe & Calvert, 1999). The dermis consists of blood vessels that provide the epidermis with nutrients-saturated blood (Choi, 2002; Dermatology channel, 2005a; Longe & Calvert, 1999). The structural components of the dermis include collagen, elastic fibres and ground substance (Choi, 2002).

The dermis consists of two layers, the superficial papillary dermis and the deeper reticular dermis (Choi, 2002; Dermatology channel, 2005a; Revis & Seagel, 2003). The papillary dermis is thinner, consisting of loose connective tissue containing capillaries, elastic fibres, regular fibres and some collagen. The reticular dermis consists of a thicker layer of connective tissue containing large blood vessels, closely interlaced elastic fibres and coarse bundles of collagen fibres (Revis & Seagel, 2003).

The dermis is made up of fibroblasts that produce collagen and elastin that provide strength, stability and resilience (Longe & Calvert, 1999; Revis & Seagel, 2003). There are also mast cells and these cells are thought to play a role in synthesising ground substance and known to be a source of the histamine that is released when the skin is immunologically provoked (Roy *et al.*, 1994:1723).

The dermis is also pervaded by a network of sensory nerves and a rich lymphatic network. The sensory nerves regulate the senses of temperature, touch, vibration and pain (Longe & Calvert, 1999). It also protects the body against infectious invaders that can go through the epidermis (Dermatology channel, 2005b).

The functions of the dermis are to supply nutrients to the epidermis, regulate temperature, strengthen the skin, and provide structure and elasticity (Longe & Calvert, 1999).

2.2. DERMATOLOGICAL PROBLEMS

There are many problems related to the skin. There are mainly two categories which can be divided into, infections and allergic reactions. Infections have different organisms that can be the cause of a problem for example bacterial, fungal or viral infections and each of these is treated differently (Gray & Toghill, 2001:175). The skin can also have allergic reactions that could lead to some skin problems for example allergic contact dermatitis (Dickel *et al.*, 2002:283).

2.2.1. NAIL ABNORMALITIES

Onycholysis is a symptom that is usually present in psoriasis and fungal infection (Anderson, 2002:1220).

White streaks with nail fungal infection can be present (Gray & Toghill, 2001:176).

Koilonychias is the developing of breakable nails and concave form and it is a sign of iron deficiency in patients (Anderson, 2002:962).

Pitting of the nails usually presents in psoriasis (Gray & Toghill, 2001:176).

2.2.2. PRURITUS

Pruritus is exacerbated at night in most systemic and inflammatory skin diseases. It is characteristic in inflammatory skin diseases for example psoriasis, atopic dermatitis and idiopathic urticaria (Hundley & Yosipovitch, 2004:889).

Pruritus has a profound impact on the quality of life and the sleep of a patient. These patients usually wake at night because of the itching and this can lead to depression in some cases (Hundley & Yosipovitch, 2004:889).

To overcome this problem the use of mirtazapine an antidepressant is effective in pruritus treatment, which is associated with miligant cholestasis lymphoma and uremia (Hundley & Yosipovitch, 2004:889). Systemic diseases may lead to internal disorders like cholestasis, renal failure, iron deficiency and lymphoma (Gray & Toghill, 2001:178).

Localised pruritus can be on the eyelids (allergic eczema), perianal region, legs, vulva, scalp or limbs (Anderson, 2002:1421; Gray & Toghill, 2001:178).

It was traditionally treated with antihistamines for the itch. Antihistamines have sedative effects and therefore daytime use is restricted (Hundley & Yosipovitch, 2004:889).

2.3. ATOPIC DERMATITIS (ECZEMA)

The worldwide prevalence of atopic dermatitis in children ranges from 2 to 30 % (Hanifin *et al.*, 2004:391). There are a few definitions to describe atopic dermatitis (AD). According to Hanifin *et al.* (2004:391); Houck *et al.* (2004:43) it is a chronic inflammatory pruritic skin disease which is usually in children but can occur in adults and follows a relapsing course. According to Lonne-Rahm *et al.* (2004:899) it is increased skin sensitivity, burning and irritation without objective visible sign of cutaneous inflammation.

Eczema is a general term to define red, scaly, itchy rash (Hanifin *et al.*, 2004:391).

With the increased rates of atopic dermatitis it is important to define which types include true risk factors and which do not (Hanifin *et al.*, 2004:391).

2.3.2. ETIOLOGY AND PATHOLOGY

Eczema is a reaction pattern, which has many origins. It can be caused by allergens or irritants (Hunter *et al.*, 1995:86). It is an inflammatory condition and looks different at different ages and races (Berger, 2003:89; Wyatt *et al.*, 2001:1802). The distribution of the lesions is characteristic, with most of the upper body involved ("monk's cowl") (Berger, 2003:89).

According to Hunter *et al.* (1995:86) there are many pathways that can lead to a reaction and are common of subtypes and inflammatory mediators (prostaglandin's, leukotrienes and cytokines). With these allergies the eosinophilia and elevated serum IgE levels may be present in AD (Berger, 2003:90).

The mechanism of stinging is to release histamine from the mast cells, which stimulates C fibres and then releases substance P or lactic acid, it then enters into the epidermis and an allergic reaction or AD may occur (Lonne-Rahm *et al.*, 2004:904).

2.3.3. CLINICAL PRESENTATION

Most of the different types of eczema share general features (Hunter *et al.*, 1995:87). The itching can be severe and prolonged. The skin is dry, leathery and lichenified (Berger, 2003:89). According to the National Skin Centre (2002a) AD is an itchy, dry, hypersensitivity skin disorder.

Patients with a disrupted barrier function tend to be more sensitive than healthy subjects (Lonne-Rahm *et al.*, 2004:899). According to Lonne-Rahm *et al.* (2004:903) most of the patients with AD also have stinging. In black patients with severe atopic dermatitis pigmentation may be lost in the lichenified areas around the wrists and ankles (Berger, 2003:90).

Most patients with AD have hyperirritable skin with the key symptom pruritus (Abramovits *et al.*, 2003:384). The skin findings in atopic dermatitis are usually symmetrically spread (Hanifin *et al.*, 2003:391). A common cause of atopic dermatitis in adults is food allergies, but stress can aggravate these symptoms or even worsen them (Berger, 2003:90; Lonne-Rahm *et al.*, 2004:904).

There are different tests that can be done to determine the allergy, for example the RAST test (Berger, 2003:90).

An acute reaction presents the following signs: redness, swelling with an ill-defined border, papules, and vesicles and in fierce cases large blisters, exudation and crusting, scaling (Berger, 2003:90). The rash may appear red, wet and weepy or dry, thickened and scaly (National Skin Centre, 2002a). Many of the patients with AD also have rhino conjunctivitis, urticaria and dermatographism. Infants usually present with rash on the face, scalp, neck and exterior surfaces and in adults the dermatitis is usually localised to the hand, eyelids or nipples (Hanifin *et al.*, 2004:391).

In a chronic eczema all the acute signs show but in general they present as less exudative vesicles, more scaly, pigmented and thickened, more likely to be lichenified and more likely to develop painful features (Hunter *et al.*, 1995:88).

Most people with atopic dermatitis outgrow their disease with adulthood and those who do not usually present with rashes in selected sites (Hanifin *et al.*, 2004:392).

2.3.4. COMPLICATIONS

Bacterial infections can occur, medication can worsen the situation and anxiety can cause severe forms of eczema (Hunter *et al.*, 1995:88; National Skin Centre, 2002a). Viral infections (*Herpes simplex*) can also occur namely *eczema herpeticum* (National skin centre, 2002a).

With long-term use of topical corticosteroids, striae and atrophy may occur. Tachyphylaxis can be a concern (Hanifin *et al.*, 2004:392).

2.3.5. TREATMENT

These patients have very irritable skins and therefore anything that dries the skin can trigger dermatitis reaction (Berger, 2003:90).

For acute weeping eczema the treatment is potassium permanganate or 0.65 % aluminium acetate solution. After each soaking it must be followed by a corticosteroid cream or lotion. The corticosteroid must be applied twice to four times daily on the dermatitis and according to Berger (2003:90) and Wyatt *et al.* (2001:1804) the potency must be appropriate for the severity of the dermatitis. A patient should be told about the permanent stain that might occur with the use of corticosteroids (Hunter *et al.*, 1995:90).

In subacute eczema the treatment would be steroid lotions or creams, but the strength will be determined by severity. Topical corticosteroids remain the mainstay of treatment for AD, yet there is uncertainty about the frequency of their use and cost-effectiveness (Green *et al.*, 2005:130; Hanifin *et al.*, 2004:393). Neomycin can also be used if an infective element is present (Hunter *et al.*, 1995:90).

The chronic eczema responds well to steroids in an ointment and is also improved by ichthammol and zinc cream (Hunter *et al.*, 1995:90).

According to Wyatt *et al.* (2001:1804) there are also other agents that can be used like antihistamines (hydroxyzine hydrochloride, cetrizine, and promethazine), leukotrine receptor antagonist (zafirlukast) and immunosuppressive agents (cyclosporine, macrolides). The antihistamines are effective in relieving itch or urticaria symptoms (Hanifin *et al.*, 2004:393).

It is found that the pulse dye laser gives a decrease in stinging and decreases the fibres that release substance P. According to Lonne-Rahm *et al.* (2004:900) lidocaine betters the stinging-positive area. Tacrolimus ointment 0.03 % or 0.1 % is an immunomodulator that is approved for AD (Abramovits *et al.*, 2003:383). Other topical therapies include emollients, calcineurin inhibitors, pimecrolimus, tars and tacrolimus (Hanifin *et al.*, 2004:393).

The local environment is altered by hydration and /or occlusion for better absorption of the medication that are applied topically (Hanifin *et al.*, 2004:393).

Preventative measures are to educate the patient. The use of moisturisers and cleansers should be limited. Photo therapy can be useful if AD is present. Systemic drugs as mentioned above are useful (Abramovits *et al.*, 2003:385).

2.4. ALLERGIC CONTACT DERMATITIS (ACD)

Allergic contact dermatitis is an acute or chronic inflammation, often asymmetric or oddly shaped, produced by substances contacting the skin and causing toxic (irritant) or allergic reactions (Beers & Berkow, 2005).

2.4.1. ETIOLOGY

Allergic contact dermatitis is a delayed hypersensitivity mechanism. The patient must previously have been induced to the allergen to have a reaction (Hunter *et al.*, 1995:92). Irritant dermatitis can affect anyone depending on the skin barrier function and the potency and duration of irritant stimulus (Internet dermatological society, 2000). The most common topicals that cause allergy are antimicrobials (neomycin), hair dyes, preservatives and adhesive tape (Elastoplasts®) (Berger, 2003:109).

The factors that cause ACD are poorly understood and clinical signs do not always guide their determination and therefore a history is important to establish potential irritants or allergens. The signs can vary from pruritus, mild erythema and eczema to gross lichenification and may be limited to small areas (Nardelli *et al.*, 2004:131).

A substance that causes ACD is called a contact allergen for example metals, skin care products and medication (Jerschow *et al.*, 2001:1098; National skin centre, 2002b). Natural rubber latex allergy is a potential life threatening, IgE mediated reaction (Warshaw & Nelson, 2001:139). Sensitivity to balsam of peru and fragrance mixture is commonly found on patch testing and can lead to allergic contact dermatitis (Salam & Fowler, 2001:377).

Patients with ACD usually find it embarrassing and it has a negative impact on their quality of life (Nardelli *et al.*, 2004:131).

2.4.2. CLINICAL PRESENTATION

In the acute phase there are tiny vesicles and weeping and crusted lesions. The symptoms are itching, burning and stinging and can vary in severity. The affected areas are warm and swollen with exudative crusting, simulating and sometimes complicated by infection (Berger, 2003:109).

2.4.3. TREATMENT

The corticosteroids do not always work well on the lesions. The suggested treatment is fluocinonide gel or clobetasol or halobetasol cream, followed by mild steroid such as triamcinolone 0.1 %. Prednisone could be given orally for up to three weeks (Berger, 2003:110).

2.5. SEBORRHEIC DERMATITIS

Seborrheic dermatitis is an inflammatory scaling disease of the scalp, face and occasionally other areas (Beers & Berkow, 2005; Johnson & Nunley, 2000:2701; Selden, 2004).

2.5.1. CLINICAL PRESENTATION

The prevalence rate internationally is 3 to 5 % (Selden, 2004). It occurs in all races and the condition is usually worse in males than in females (Johnson & Nunley, 2000:2701; Selden, 2004).

The symptoms develop gradually, and the dermatitis usually is apparent only as dry or greasy diffuse scaling of the scalp with variable pruritus (Beers & Berkow, 2005).

In severe cases, yellow-red scaling papules appear along the hairline, behind the ears, in external auditory canals, on eyebrows, on the bridge of the nose, in the nasolabial folds and over the sternum. Marginal blepharitis with dry yellow crusts and conjunctival irritation may be present. Seborrheic dermatitis does not cause hair loss (Beers & Berkow, 2005).

It is commonly aggravated by changes in humidity, or emotional stress (Selden, 2004).

2.5.2. TREATMENT

In adults, zinc pyrithione, selenium sulphide, sulphur and salicylic acid or tar shampoo can be used daily until it is under control, then the shampoo can be used twice weekly (Johnson & Nunley, 2000:2702). Thereafter, corticosteroid lotion (0.01 % fluocinolone acetonide or 0.025 % triamcinolone acetonide lotion) can be rubbed into the scalp or hairy areas until scaling and redness are controlled (Beers & Berkow, 2005; Selden, 2004).

A 1 % hydrocortisone cream can be used three times daily, and after the symptoms have disappeared; it can be used daily. In some patient's 2 % ketokonazole cream or imidazole twice daily for up to two weeks induces a remission that lasts for a month (Beers & Berkow, 2005).

2.6. NUMMULAR DERMATITIS

Nummular dermatitis is a chronic inflammation of the skin characterised by coin-shaped, vesicular, crusted, scaling, and usually pruritic lesions (Beers & Berkow, 2005; Miller *et al.*, 2004; Skin site, 2003b).

2.6.1. CLINICAL PRESENTATION

The cause is unknown, but it is found that it is more common in the winter (Skin site, 2003b). Nummular eczema is frequently associated with dry skin and substances such as wool, soaps and frequent baths that can worsen the condition (Miller *et al.*, 2004; Skin site, 2003b).

The crusts are being formed by the discoid lesion that starts as pruritic patches of confluent vesicles and papules that later ooze serum (Beers & Berkow, 2005). These lesions are eruptive and widespread. They are often more prominent on the extensor aspects of the extremities and on the buttocks, but can also appear on the trunk (Beers & Berkow, 2005; Miller *et al.*, 2004).

It is a condition that is not a very frequent disease, but is one that is more frequent in males than it is in females (Miller *et al.*, 2004).

2.6.2. TREATMENT

There is no treatment that is effective. Orally cloxacillin or cephalexin 250 mg may be given empirically along with tap water compresses, especially when weeping and pus are present (Beers & Berkow, 2005; Miller *et al.*, 2004).

A corticosteroid cream or ointment (e.g., triamcinolone) should be rubbed in three times daily and an occlusive dressing with a corticosteroid cream under polyethylene film applied at bedtime (Beers & Berkow, 2005; Skin site, 2003b).

If infection is present antibiotics can be taken (eg, dicloxacillin, erythromycin). Prednisone can be taken for severe generalised flares; it may decrease inflammation (Miller *et al.*, 2004).

2.7. POMPHOLYX (DYSHIDROSIS)

Dyshidrosis is a chronic condition characterised by deep-seated pruritic vesicles on the palms, sides of the fingers, and the soles (Beers & Berkow, 2005).

2.7.1. CLINICAL PRESENTATION

Pompholyx presents as scaling, redness and oozing often followed by vesiculation. Sweating may be decreased, normal or excessive. In most cases pompholyx is idiopathic (Beers & Berkow, 2005).

In the US pompholyx occurs in as many as 5 to 20 % of patients with hand eczema and is more common in warmer climates. The frequency ratio in male and female is 1:1 (Burdick & Santos, 2005).

2.7.2. TREATMENT

The following treatment guidelines are followed:

- If possible find the cause and remove it.
- Cool compresses.
- Emollients (dimethicone barrier cream, should be applied liberally and frequently to keep the skin soft).
- Corticosteroid cream or ointment three times daily may decrease pruritus, but clearing dermatitis require overnight occlusive therapy.
- Antibiotics such as flucloxacillin (four times a day).
- A two-week course of oral prednisone 40 mg per day is occasionally needed and the dose should be slowly decreased during the treatment time.
- Oral retinoids (etretinate 25 to 50 mg per day) may be a last resort.
- Metotrexate, dapsone, azathioprine and botulinum toxin (to prevent sweating) were used occasionally (Beers & Berkow, 2005; DermNet NZ, 2004c).

2.8. GENERALISED EXFOLIATIVE DERMATITIS

Generalized exfoliative dermatitis is characterised by a severe widespread erythema and scaling of the skin (Beers & Berkow, 2005).

2.8.1. ETIOLOGY

The cause is usually not determined, but some cases are secondary to certain dermatitis (e.g., atopic dermatitis, contact dermatitis) and others may be induced by a systemic drug (e.g., penicillin, sulphonamides) or a topical agent (Beers & Berkow, 2005).

2.8.2. CLINICAL PRESENTATION

The onset may be insidious or rapid. The entire skin surface becomes red, scaly, thicker and occasionally crusted. Pruritus may be severe or absent and the characteristic appearance of any primary dermatitis is usually lost (Beers & Berkow, 2005).

The patient may feel cold and experience an elevated temperature, weight loss, hypoproteinemia, hypocalcemia, iron deficiency, or high-output heart failure (Beers & Berkow, 2005).

2.8.3. TREATMENT

A good history must be taken and the cause must be determined. This disease is life threatening and hospitalisation is usually necessary. Petrolatum jelly applied after tap- water baths gives temporary relief. Oral corticostroids should be used (40 to 60 mg per day) for about 10 days. The prednisone should be decreased as the treatment continues (Beers & Berkow, 2005).

2.9. STASIS DERMATITIS

Stasis dermatitis is a persistent inflammation of the skin of the lower legs commonly associated with venous incompetency (Beers & Berkow, 2005).

2.9.1. ETIOLOGY

The eruption is usually localised to the ankle, where edema, erythema, mild scaling and brown discoloration occur (Beers & Berkow, 2005). It usually occurs as a direct consequence of venous insufficiency. The disturbed function of the valvular system in the deep venous plexus of the legs results in backflow of blood from the deep venous system to the superficial venous system. This loss of the valvular function can result from age-related decrease in valve competency (Flugman & Clark, 2004).

2.9.2. CLINICAL PRESENTATION

It is a common inflammatory skin disease that occurs on the lower extremities in patients with chronic venous insufficiency. This disease usually affects the middle-aged and elderly patients (Flugman & Clark, 2004).

2.9.3. COMPLICATIONS

Edema and varicose veins are frequent. Because of the relative lack of symptoms, the condition is often neglected, which can result in increasing edema, secondary bacterial infection, eventual ulceration, infection of the underlying bone and permanent scars (Beers & Berkow, 2005; Lehrer, 2003).

2.9.4. TREATMENT

Elevating the ankle above the heart while resting and applying topical therapy are necessary. Unless circulation improves the approach is relatively ineffective (Beers & Berkow, 2005).

The topical therapy, usually corticosteroids (e.g., triamcinolone 0.1 %), is used. Acute dermatitis is treated with continuous and then intermitted tap water compresses. In exudative lesions a more absorbent hydrocolloid dressing should be applied. When a less acute dermatitis presents a corticosteroid cream or ointment should be applied three times daily or incorporated into zinc oxide paste (Beers & Berkow, 2005; Flugman & Clark, 2004).

2.10. URTICARIA

According to Henderson *et al.* (2000:1084) urticaria affects 15 % to 25 % of the population at some point during their lives.

2.10.1. CLINICAL PRESENTATION

Urticaria or hives, as it is commonly called, is an itchy rash consisting of localised swelling of the skin that usually lasts for a few hours (National skin centre, 2002g). Lesions are itchy red swellings and can last up to 24 hours (Berger, 2003:117).

It can result from some changes in the small blood vessels of the skin and usually from the release of histamine and either an allergic reaction or non-allergic reaction can take place. It can be caused by drugs, food or viral infection (National skin centre, 2002g).

2.10.2. TREATMENT

A good history should be taken, because some drugs or insect bites or other physical factors can cause the onset of urticaria (Berger, 2003:118). The aggravating factors should be avoided (National skin centre, 2002g).

Anti-histamines (hydroxyzine, cyproheptadine), a tricyclic depressant (doxepin) and other agents with potential such as calcium blockers, terbutaline, danazol or colchicine can be used (Berger, 2003:118; National skin centre, 2002g).

2.11. PSORIASIS

A definition of psoriasis according to Wells *et al.* (2003:163) is as follows: a common disease characterised by recurrent exacerbation and remission of thickened, erythematous and scaling plaques.

Psoriasis is a benign, acute or chronic inflammatory disease that appears to be based on a genetic predisposition (Berger, 2003:92). According to Wells *et al.* (2003:163) it is caused by something unknown.

The epidermis is abnormal in psoriasis; the turnover of cells is seven times higher than normal epidermis (Wells *et al.*, 2003:163). Precipitating factors include trauma, infection, hormonal imbalances, sunlight, drugs, cigarette smoking and alcohol and emotion (Hunter *et al.*, 1995:54).

The financial impact is quite high and the disease also demands much care. The time needed to care for psoriasis and the interference with work can lower the quality of life in work and money matters (Choi & Koo, 2003:S59; Kulkarni *et al.*, 2005:27).

2.11.1. CLINICAL PRESENTATION

There are often no symptoms, but itching may occur (Berger, 2003:92).

The most common symptom presents as plaque patterns. The lesions are pink or red with large, dry silvery-white scales. Lesions are characterised by sharply demarcated, erythematous papules and plaques often covered with silver-white fine scales. If the fine scale is removed a salmon-pink lesion is exposed, sometimes with punctuate bleeding (Wells *et al.*, 2003:163). Plaque psoriasis is characterised by periods of spontaneous relapse and remission (Barclay & Lie, 2005).

Guttate patterns are mostly seen in children and adolescents and may be the first sign of the disease, often triggered by tonsillitis. Pharyngeal infection is a risk factor for psoriasis and also a strong family history of psoriasis. Guttate psoriasis is characterised by the eruption of small erythematous and scaling lesions over the upper trunk (Naldi *et al.*, 2001:433).

The scalp is often involved and also the nails (Berger, 2003:92; Hunter *et al.*, 1995:56). Psoriasis can occur anywhere, but the scalp, elbows, knees, palms and soles and nails must be looked at while examining a patient. The glans penis and vulva may be affected. Sometimes only the flexures are involved (Berger, 2003:92).

According to Wyatt *et al.* (2001:1804) psoriasis is characterised by epidermal hyperpropiferation. Non-specific tongue lesions are frequently observed in psoriasis (Daneshpazhooh *et al.*, 2004:16). The small joints can be affected and may be painful and is called psoriatic arthritis (Hunter *et al.*, 1995:58). Psoriatic arthritis is a form of inflammatory arthritis, which occurs in 7 to 39 % of patients with psoriasis (Mease, 2004:389).

2.11.2. COMPLICATION

The subsequent effects on a patient's social and mental health can be dramatic (Choi & Koo, 2003:S57). According to Kulkarni *et al.* (2005:29) stress is associated with psoriasis. Psoriasis has a negative effect on the mental dimension (Choi & Koo, 2003:S60).

2.11.3. TREATMENT

According to the National Skin Centre, (2002e); Wyatt *et al.* (2001:1805) coal tar preparations, dithranol, calciprotriol, anthralin, tazarotene and topical cortico-steroids can be used to treat psoriasis. Ultra-violet radiation and combination therapy can also be useful in the treatment of psoriasis (Hunter *et al.,* 1995:64).

Systemic treatment of psoriasis: retinoids, methotrexate, cyclosporin and others (Hunter *et al.*, 1995:64). For most patients it is easy to use high-potency to highest potency steroid cream or ointment and if possible one must restrict the highest-potency steroids because it can make the skin thinner (Berger, 2003:92).

Methotrexate is an established and highly effective systemic treatment for severe psoriasis and the adverse effects are abnormal liver function tests, nausea and gastric complaints. The feared adverse effects are myelosuppression and hepatotoxicity and therefore low doses of methotrexate must be administrated. Methotrexate is a competitive inhibitor of dihydrofolate reductase. The patient should be informed that the drug must be taken on an empty stomach, because food can impair the absorption (Kuijpers & Van der Kerkhof, 2000:29).

According to Barclay & Lie (2005) an increase in the course of efalizumab treatment for plaque psoriasis from 12 to 24 weeks increases efficiency without increasing toxicity. It reduces itching symptoms.

Although the use of oral retinoid as monotherapy is effective in psoriasis treatment it, is usually used in combination. Calcipotriol might enhance the clinical outcome of systemic acitretin therapy and can lead to faster remission. Adverse effects in this combination therapy are cellitis, exfoliation, hair loss, abnormal lipid levels, and gastrointestinal effects. With the retinoid as a monotherapy the liver enzymes are elevated (Rim *et al.,* 2003:507; 509). UVA treatment can improve psoriasis to such an extent that total clearance can be achieved (Legat *et al.,* 2004:752).

How not to make psoriasis worse: do not scratch, do not stop treatment and do not lose faith (National skin centre, 2002e).

2.12. PITYRIASIS ROSEA

Pityriasis rosea is a common mild, acute inflammatory disease and is more common in females than in males (Berger, 2003:94).

2.12.1. CLINICAL PRESENTATION

Pityriasis rosea is an acute or occasionally subacute, asymptomatic or symptomatic condition affecting mainly children and young adults (Sharma *et al.*, 2000:241).

A diagnosis is made by findings on one or more classic lesions and the lesions consist of oval, fawn-coloured plaques and itching is common but usually mild. The centre of the lesions has a cigarette paper appearance and a collarette scale. Only a few lesions can have this characteristic appearance. The lesions have the so-called Christmas tree pattern and often the proximal portions of the extremities are involved. The lesion often has a general eruption by 1 to 2 weeks. The eruptions usually last 1 to 2 months and heal without scarring (Berger, 2003:94).

2.12.2. TREATMENT

It usually does not need treatment but in some cases where the lesions remain hyperpigmentated for a long time treatment might be necessary (Berger, 2003:94). UVA treatment daily is the most effective in the management of rosea or prednisone can also be administrated (Berger, 2003:94; Sharma *et al.*, 2000:241).

Topical steroids like triamcinolone 0.1 % can be used and erythromycin for 14 days can clear a patient up to 73 % (Berger, 2003:94; Sharma *et al.*, 2000:241). Various treatment like dapsone, sunlight, UV and ketotifen have been used in the disease management (Sharma *et al.*, 2000:241).

2.13. ROSACEA

In the same way that there is no cure for some other diseases there is also no cure for *rosacea* (International rosacea foundation, 2005). *Rosacea* is a common disorder that affects the face (National skin centre, 2002f). This disorder significantly affects patients' lives and can lead to emotional distress and withdrawal from society (Tan & Tope, 2004:592). According to Erhard

(2000) one in 20 Americans may be affected with *rosacea*. *Rosacea* usually appears in the 30s, 40s and 50s (Erhard, 2000; International rosacea foundation, 2005).

2.13.1. ETIOLOGY

The etiology is unknown and usually onset occurs at the ages between thirty and fifty years (International rosacea foundation, 2005; National skin centre, 2002f). *Rosacea* predominates in females but is more severe in males (National skin centre, 2002f).

No single factor explains the pathogenesis of this disorder (Berger, 2003:113; Tan & Tope, 2004:592). This disorder predominately affects fair skinned people but it can affect any one (National skin centre, 2002f; Tan & Tope, 2004:592). *Rosacea* is a hereditary, long-term skin disorder that most often appears on the forehead, cheekbones and chin (International rosacea foundation, 2005).

It seems to affect fair-skinned people more often and usually there is a family history for those who have *rosacea* (International rosacea foundation, 2005; National skin centre, 2002f).

2.13.2. CLINICAL PRESENTATION

The distribution is symmetrical localization on the face and may involve ocular lesions (National skin centre, 2002f). The cheeks, nose and chin may have a rosy look. According to the International rosacea foundation (2005) the symptoms are flushing and inflammatory patches in the face. Inflammatory papules are prominent and associated seborrhoea may be found (Berger, 2003:113). Small blood vessels on the face, bumps or pimples on the face and watery and irritated eyes are warning symptoms of *rosacea* (International rosacea foundation, 2005).

The secondary symptoms are burning or stinging, erythematous plaques, dry appearance, edema, ocular manifestation and phymatous changes (Tan & Tope, 2004:592). Edema may be present (National skin centre, 2002f).

Rosacea progresses in the following steps: Pre-*rosacea* – flushing and blushing, *vascular rosacea* – erythema and telangiectasia, inflammatory *rosacea* – papules and pustules and late *rosacea* – rhinophyma (National skin centre, 2002f).

Facial flushing is a prominent feature and usually the origin of manifestation of the disease, such patients should avoid activities that can cause or induce flushing (International rosacea foundation, 2005; National skin centre, 2002f).

Factors that can cause *rosacea* are hot fluids, sun exposure, spicy foods, extreme foods, extreme temperatures, alcohol beverages, stress and long term use of fluorinated corticosteroids (International rosacea foundation, 2005; National skin centre, 2002f). An interesting observation made by Heymann, (2004:90) is that the facial skin temperature is higher in patients with *rosacea.*

2.13.3. COMPLICATIONS

Rhinophyma is an enlargement of the nose and the skin thickens with enlarged follicles. It is more common in males than females (Heymann, 2004:90; International rosacea foundation, 2005; National skin centre, 2002f). Over time permanent changes can appear and a person' self-esteem can be affected (International rosacea foundation, 2005; Tan & Tope, 2004:592).

2.13.4. TREATMENT

Topical steroids should be avoided because they can cause rebound erythema and worsen the condition. Low potency oral steroid should be used (National skin centre, 2002f). Metronidazole 0.75 % gel or cream can be applied topically and if not tolerated clindamycin can be used as an alternative (Berger, 2003:113; International rosacea foundation, 2005).

Systemic tetracycline or erythromycin can be administered (Berger, 2003:114; National skin centre, 2002f). Isotretinoin may be effective where other therapies fail (Berger, 2003:114). Tretinoin in the topical form is active against acne and other skin conditions (International rosacea foundation, 2005). It is important to educate the patient on alcohol use with antibiotics

in some cases, especially in metronidazole a disulfiram-reaction can be produced (Berger, 2003:114).

Combination therapies can be applied for *rosacea* if acne is present, for example clindamycin and benzoyl peroxide or erythromycin and benzoyl peroxide (International rosacea foundation, 2005).

The laser treatment of *rosacea* improves erythema and the quality of life. The laser treatment improves the flushing, burning, itching, dryness, swelling and sensitivity (Tan & Tope, 2004:592).

2.14. MILIARI (HEAT RASH)

Heat rash is an acute dermatitis that occurs mostly on the trunk and intertriginous areas and a warm, moist environment is the biggest cause (Berger, 2003:115).

2.14.1. CLINICAL PRESENTATION

The complaints are burning and itching and in severe cases, fever, heat prostration and even death may occur. The covered areas are the places that are mostly affected. The lesions are small, superficial, reddened, thin-walled discrete but aggregated vesicles (Berger, 2003:115).

2.14.2. TREATMENT

Triamcinolone acetonide, 0.1 % is in saran lotion. The drying aspect also helps prevent the onset of the rash (Berger, 2003:115).

2.15. ACNE

The definition of acne, *Acne vulgaris* is that it is a common, usually self-limiting multifactor disease involving inflammation of sebaceous follicles of the face and upper trunk (Shalita, 2004:386; Wells *et al.*, 2003:156). It can result from the action of hormones on the skin's oil

glands, which can lead to the plugging of pores and the outbreaks of lesions (National institute of arthritis and musculoskeletal and skin disease, 2001).

2.15.1. ETIOLOGY AND PATHOLOGY

The exact cause is unknown (Tropy *et al.*, 2004:764). The risk factors for the development of acne or for up-regulation of its severity include smoking, male sex, and youth (Krautheim & Gollnick, 2004:398). This appears to be more common in women and it has been speculated that hormonal influences, stress and cosmetics play a role in acne (Shalita, 2004:385). Physical factors controlling colonization are mainly functions of the skin structure (Bojar & Holland, 2004:385).

Acne is a disease of the pilosebaceous unit. It consists of a sebaceous gland connected to the follicle that contains a fine hair (National institute of arthritis and musculoskeletal and skin disease, 2001). The cells in the pilosebaceous duct contain androgen receptors (Cunliffe *et al.*, 2004:368; Thiboutot, 2004:419).

The sebaceous lipids are unique to humans and are very complex (Cunliffe *et al.*, 2004:367). The sebaceous gland makes an oily substance called sebum (National institute of arthritis and musculoskeletal and skin disease, 2001). The functions of the sebaceous gland: Sebum production, regulation of cutaneous steroid genesis, regulation of local androgen synthesis, interaction with neuropeptides, synthesis of specific lipids with antimicrobial activity and exhibition of pro- and anti-inflammatory properties (Zouboulis, 2004:361).

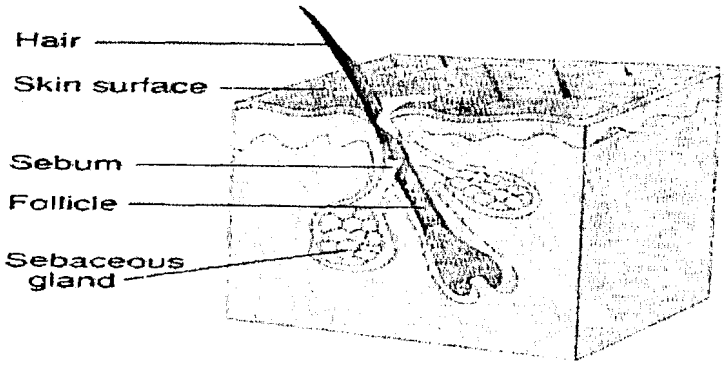


Figure 2.2: Normal pilosebaceous unit (National institute of arthritis and musculoskeletal and skin disease, 2001).

A primary lesion is also known as a comedo (National institute of arthritis and musculoskeletal and skin disease, 2001; Wells *et al.*, 2003:156). The comedones result from abnormalities in the proliferation and differentiation of ductal deratinocytes (Cunliffe *et al.*, 2004:367). According to Cunliffe *et al.* (2004:368) androgens may play an important role in comedogenesis. Keratinocytes produce cytokines that are also likely to produce comedone formation (Cunliffe *et al.*, 2004:368).

The follicular canal widens and cell production increases and the sebum, keratinocytes and the hair fill the narrow follicle, an early sign of acne (National institute of arthritis and musculoskeletal and skin disease, 2001; Wells *et al.*, 2003:156). The sebum mixes with loose cells in the follicular canal and forms a keratinous plug. This appears as an open comedo ("blackhead") (Wells *et al.*, 2003:156). The keratinocyte cells line the follicle (National institute of arthritis and musculoskeletal and skin disease, 2001).

According to the Tropy *et al.* (2004:764) there is no evidence that food causes acne.

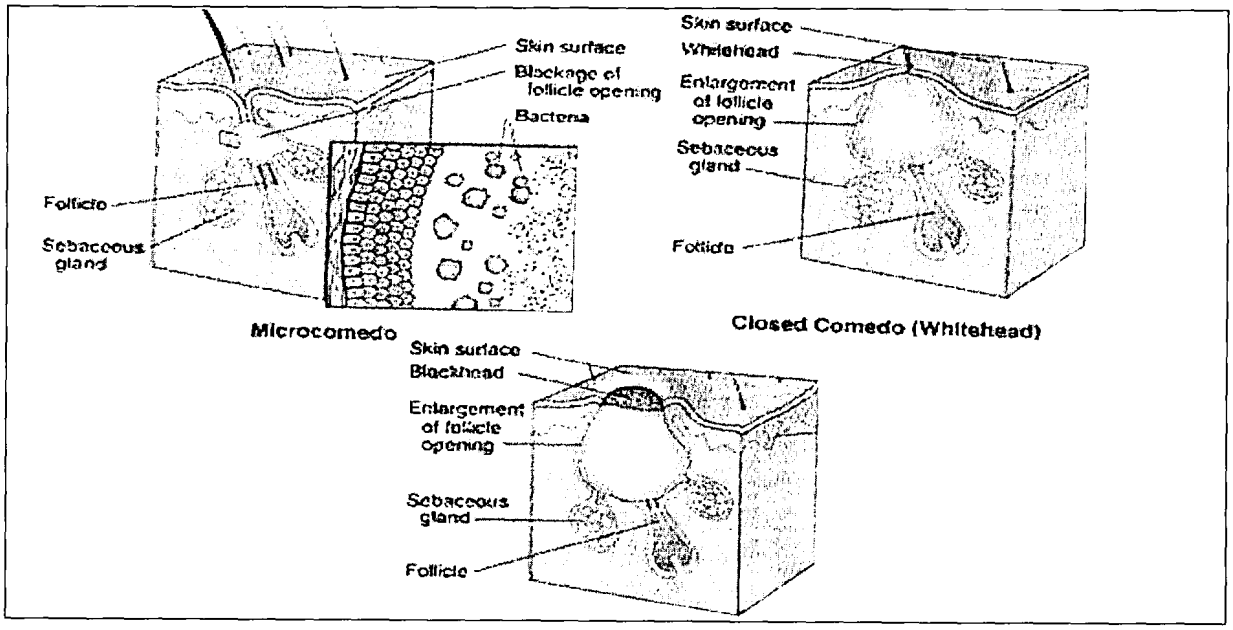


Figure 2.3: Types of lesions (National institute of arthritis and musculoskeletal and skin disease, 2001).

2.15.2. CLINICAL PRESENTAION

The condition is primarily found on the face, but also on the back, chest and shoulders. The presentation can range from mild to severe. These lesions can take months before they heal completely and it can leave permanent scarring (Wells *et al.*, 2003:156). The clinical type of comedo should influence the choice of treatment (Cunliffe *et al.*, 2004:371).

The exact cause of acne is unknown, but doctors believe it is related to several factors:

- Increased hormones called the androgens (male sex hormone)
- Heredity or passed on genetically
- Certain drugs
- Greasy cosmetics (National institute of arthritis and musculoskeletal and skin disease, 2001).

2.15.3. COMPLICATION

Bacteria can get involved in the comedones like *Propionibacterium acnes* (Cunliffe *et al.*, 2004:368). People who have severe forms of acne are likely to develop scars (Haider *et al.*, 2004:726).

2.15.4. TREATMENT

People with mild signs of acne are usually treated with topical medicine that is directly applied to the affected acne areas (National institute of arthritis and musculoskeletal and skin disease, 2001). Topically the treatment for acne is tretinoin, adapalene, tazarotene, azelaic acid, benzoyl peroxide, clindamycin, erythromycin and metronidazole (Krautheim & Gollnick, 2004:401; National institute of arthritis and musculoskeletal and skin disease, 2001; Wyatt, 2001:1809).

In severe forms of acne systemic treatment is necessary and the patient usually receives antibiotics for example clindamycin, tetracycline, or erythromycin (Bojar & Holland, 2004:378; Katsambas & Papakonstantinou, 2004:413; National institute of arthritis and musculoskeletal and skin disease, 2001). In some cases the prescription combine the topical and the systemic

treatments to get a better effect (National institute of arthritis and musculoskeletal and skin disease, 2001).

Adapalene is a retinoid agent that is indicated for the topical treatment of *acne vulgaris* (Waugh *et al.*, 2004:369). It has a rapid onset of action and is more tolerable compared to other retinoids and with the low absorption through the skin interactions are unlikely (Waugh *et al.*, 2004:370). Isotretinoin is the most effective compound in reducing sebaceous gland size decreasing proliferation of basal sebocytes and suppressing sebum production (Zouboulis, 2004:364).

Topical retinoids can be used to treat all types of acne (Rigopoulos *et al.*, 2004:410).

Hormonal treatment in acne is prednisone and dexamethasone (can cause adrenal suppression) and levonorgestrel/ethinyl estradiol (Katsambas & Papakonstantinou, 2004:416; Thiboutot, 2004:423).

Mild acne	Comedonal	Topical retinoid and physical removal of comedones	OR • Other topical retinoid • Azelaic acid • A-hydroxy acid • B-hydroxy acid • Combinations
	Papulopostular	Topical retinoids and/or benzoyl peroxide	OR • Other topical retinoid • Topical antimicrobial • Azelaic acid
Modurate acne	Papulopostular	Oral antibiotic and a topical retinoid +/- benzoyl peroxide	OR • Oral isotretionoin
	Nodular	Oral antibiotic and topical retinoid and benzoyl peroxide	OR • Oral isotretionoin
Severe acne		Oral isotretionoin	High dose oral antibiotic and topical retionoid and benzoyl peroxide

Figure 2.4: The different treatments according to the severity of acne (**adapted** from Katsambas & Papakonstantinou, 2004:443).

2.16. FOLLICULITIS

Folliculitis is an inflammation of the hair follicle caused by infection or physical or chemical irritation (Cyr, 2004). Folliculitis is the name given to a group of skin conditions in which there are inflamed hair follicules (DermNet NZ, 2005a).

2.16.1. ETIOLOGY

Usually folliculitis is a bacterial infection of the hair follicles or the skin surrounding the hair (Skin site, 2004). Folliculitis has multiple causes. It can be caused by gram positive or gram negative organisms or even be a non-bacterial infection (Berger, 2003:114).

It is result of obstruction or disruption of an individual hair follicle and the associated pilosebaceous units is the pathophysiology of folliculitis (Cyr, 2004).

Pseudomonas folluculitis results from the bacterial colonisation of hair follicles after exposure to contained, contaminated water (Toner & Krivda, 2003).

2.16.2. CLINICAL PRESENTATION

Staphylococcus aureus is the most common bacteria causing folliculitis and it is known that this bacterium infects the hair follicle (Skin site, 2004).

There are also other factors that can lead to folliculitis such as tight or occlusive clothing such as polyester, contact with oils, tar and grease, and heat and sweating can also contribute (Skin site, 2004). Folliculitis can be caused by bacteria namely *S. aureus* or *P. aeruginosa,* yeasts namely *Pityrosporum ovale, Malssezia fufur* or *Pitosporum folliculitis*, fungi and irritation from regrowing hairs (DermNet NZ, 2005a).

With *pitosporum folliculitis* the signs are pruritic acne like eruption on the upper back and chest, upper arms, neck, chin and sides of the face (Cyr, 2004).

The complaints range from burning and tenderness to intense itching (Berger, 2003:114). In mild folliculitis the complaints are red bumps in the hair bearing area that may be painless or cause discomfort or pruritus (Cyr, 2004; Luelmo-Aguilar & Santandreu, 2004:301). The hair follicle is where the lesions are present (Berger, 2003:114). The primary lesion in folliculitis is a papule or pustule with a central hair (Cyr, 2004).

It seems to be more common in people with *diabetes mellitus*, obese or immunocompromised patients. The causes can be brought forward by friction, perspiration, occlusion or shaving and other factors (Cyr, 2004).

A rash characterises pseudomonas folliculitis; the lesions begin as pruritic erythematous macules that progress to papules and pustules (Toner & Krivda, 2003).

2.16.3. TREATMENT

Treatment with oral or topical antibiotics is empiric (Cyr, 2004). The area should be cleaned with chlohexidine before applying saline or aluminum subacetate soaks (Berger, 2003:115). The cleaning should be done once to twice a day and the antibacterial soap is helpful (Cyr, 2004; Skin site, 2004).

If the originator organism was *Staphylococcus aureus* antibiotics would be necessary. The recommended antibiotics include cephalosporin, erythromycin, clindamycin, dicloxacillin, rifampin and ciprofloxacin (Cyr, 2004; Luelmo-Aguilar & Santandreu, 2004:304). There is usually also a nasal treatment with muporocin (Cyr, 2004). To wear loose cotton clothing can help prevent folliculitis (Skin site, 2004).

2.17. FURUNCULOSIS

Furunculosis is an extremely painful inflammatory swelling based on a hair follicle that forms an abscess (Berger, 2003:134).

2.17.1. ETIOLOGY

Furuncle is a deep-seated infection involving the entire hair follicle and adjacent subcutaneous tissue (Berger, 2003:134; Moses, 2005; Slomiany, 2005). It often begins as folliculitis (Moses, 2005).

The most common sites of occurrence are the hairy parts exposed to irritation and friction, pressure or moisture (Berger, 2003:134; Moses, 2005).

It is usually caused by *Staphylococcus aureus* (Berger, 2003:134; DermNet NZ, 2004a; Moses, 2005; Ray, 2003:91; Slomiany, 2005). According to Moses (2005), *streptococcus* species and other bacterial infections may also cause it.

2.17.2. CLINICAL PRESENTATION

The abscess is either rounded or conical which gradually enlarges, becomes fluctuant and then softens and opens spontaneously (Berger, 2003:134; Moses, 2005).

The surrounding skin becomes swollen, red, hot and tender to touch (South African National Department of Health, 2003:83).

Inflammatory nodules affecting the hair follicle develop into a pustule (Ray, 2003:91). Tender in duration with severe inflammation, followed by necrosis (Moses, 2005; Ray, 2003:91).

2.17.3. COMPLICATIONS

Serious and sometimes fatal carvenous sinus thrombosis may occur. Perinephric abscess, osteomyelitis and even endocarditis may occur but are rare (Berger, 2003:135).

According to Moses (2005), cellulites, gangrene, necrotizing fasciitis, hidradenitis suppurative and recurrent furunculosis may develop.

2.17.4. TREATMENT

Incision and drainage is recommended. Sodium dicloxacillin or cephalexin is usually effective and in penicillin-allergic patients erythromycin is used. Ciprofloxacin 500mg is used in *staphylococci* resistant strains (Berger, 2003:135). If fever and swollen lymph nodes are present flucloxacillin or erythromycin must be taken orally (South African National Department of Health, 2003:84).

In recurrent furunculosis combination therapy is used, namely dicloxacillin and rifampin. Clindamycin can be used for one to two months in recurrent furunculosis (Berger, 2003:135).

Family members or close contacts must be evaluated for staphylococcal carrier and if one is a carrier mupirocin topical must be used in the nares, acillae and anogenital areas for 5 days to eliminate carrier state (Berger, 2003:135;; Ray, 2003:91).

The pain can be reduced by covering the boil with a flannel soaked in hot water and the pus can be drained by needle and syringe (DermNet NZ, 2004a). General hygiene must also be encouraged (South African National Department of Health, 2003:83).

2.18. FUNGAL INFECTIONS

Different fungal infections that occur on the skin and nails will be discussed in the section below.

2.18.1. TINEA CORPORIS AND TINEA CIRCINATA (BODY WORM)

Lesions are often on exposed areas of the body such as the face and arms (Berger, 2003:96). *Tinea corporis* is a dermatophyte infection of the neck, trunk and extremities and transmitted from domestic animals and the environment (Davis, 1995:157).

2.18.1.1. CLINICAL PRESENTATION

The lesions are typically found on the head, neck and arms, rarely on the legs (Adams, 2002:287). The lesions, rings of erythema, have an advanced scaling border and central clearing and itching may be present (Berger, 2003:96). It appears as scaly, reddish, ring-shaped patches with the tendency to form complete rings with raised borders (National skin centre, 2002d).

2.18.1.2. COMPLICATIONS

The disease can complicate and go down the hair follicle, pyoderma and dermatophytid and it can become more difficult to cure (Berger, 2003:96).

2.18.1.3. TREATMENT

The treatment is based on the severity and extent of the infection (Davis, 1995:157).

There are topicals that are effective against it, e.g. miconazole 2 % cream, clotrimazole 1 % solution or cream or lotion, ketoconazole 2 % cream, econazole 1 % cream and terbinafine 1 % cream (Adams, 2002:288; Berger, 2003:97). The important part of treatment is that treatment should be continued for up to two weeks after clearing (Berger, 2003:97). Terbinafine (Lamisil®) is a topical antifungus agent that is effective against dermatophytes (Davis, 1995:158).

Griseofulvin 250-500 mg twice daily could be used and only 2-4 weeks are required (Adams, 2002:288; Berger, 2003:97; Davis, 1995:158). Itaconazole single dose of 200 mg is also effective. Terbinafine 250 mg daily for a month can also be effective (Berger, 2003:97). The agent fluconazole 200 mg can also be taken once a week for four weeks (Adams, 2002:288).

There is also a new topical drug that is approved by the FDA namely sertaconazole nitrate that is an imidazole (Hussar, 2005:185).

2.18.2. TINEA CRURIS (JOCK ITCH)

The lesions of *Tinea cruris* can be confined to the groin and gluteal cleft (Berger, 2003:97).

2.18.2.1. CLINICAL PRESENTATION

The lesions have sharp margins, cleared centres and active spreading and the area may be hyperpigmentated. Itching can be severe or the rash can be asymptomatic (Berger, 2003:97).

2.18.2.2. TREATMENT

In general the patient should use a drying powder especially on the perspiration areas and the underwear must be loose-fitting (Berger, 2003:97).

The following drugs can be used, namely miconazole, clotrimazole and terbinafine and also the medicines that are used for *Tinea corporis* (Berger, 2003:97).

Systemic griseofulvin is used for severe cases for two weeks. Itraconazole and terbinafine are only used for a week only (Berger, 2003).

The new approved FDA topical drug sertaconazole nitrate can also be used in *tinia cruris* (Hussar, 2005:189).

2.18.3. TINEA MANUUM AND TINEA PEDIS (DERNATOPHYTOSIS, TINEA OF PALMS AND SOLES (ATHLETE'S FOOT)).

A *Tinea* infection on the foot is an extremely common feature and is mostly caused by *trichophyton species* (Berger, 2003:98).

2.18.3.1. CLINICAL PRESENTATION

The first symptoms are itching, burning or stinging. Secondary infections can occur and can lead to cellulites as a complication. *Tinea* often appears as a scaling or fissuring of the toe webs (Berger, 2003:98).

Athlete's foot is present when the skin between the toes becomes very scaly and peels, while itching may be experienced. This can spread to the soles or the toenails, and is known as *Tinea pedis* (National skin centre, 2002c).

2.18.3.2. PREVENTION

The best thing to do is to have good personal hygiene and wear open sandals if possible. Always shower or bath with rubber sandals in public bathrooms and dry thoroughly between the toes. If a person wears socks they must be changed regularly and dusting or drying powders should be applied as necessary (Berger, 2003:98; National skin centre, 2002c).

2.18.3.3. TREATMENT

While in the macerated stage it is treated with aluminium subacetate solution soaks for 20 minutes twice daily or broad-spectrum antifungal creams and solutions that have imidazoles or ciclopirox as active ingredients (Berger, 2003:99).

In the dry and scaly stage the drugs used for *Tinea corporis* are also effective. The efficacy can be increased by an occlusive dressing with the use of urea 10 % cream or lotion (Berger, 2003:99). For the systemic treatment itraconazole and terbinafine can be used. Terbinafine 250 mg given daily for a period of twelve weeks is effective against dermatophyte (De Backer *et al.*, 1996:16). In severe cases griseofulvin 500 mg is used for six weeks in the treatment (Berger, 2003:99; Faergemann *et al.*, 1995:S95). After systemic treatment the patient maintains the cleaning with topical treatments to prevent recurrence (Berger, 2003:99).

The newly approved FDA topical drug sertaconazole nitrate can be used in *Tinea pedis* (Hussar, 2005:185).

2.18.4. TINEA VERSICOLOR (PITYRIASIS VERSICOLOR)

Tinea versicolor is a mild, superficial *Malassezia fufur* infection that usually presents on the trunk (Berger, 2003:99).

2.18.4.1. CLINICAL PRESENTATION

The lesions are asymptomatic and are velvety, tan, pink, white or brown macules. Itching can occur. The lesions do not look scaly but with scraping the area scales can be obtained (Berger, 2003:99).

2.18.4.2. TREATMENT

Topical treatment includes selenium sulphide lotion and it is applied from the neck to the waist daily for 15 minutes for a week. Ketoconazole and selenium sulphide lotion are used for maintenance (Berger, 2003:99). A treatment of two topical applications daily of clotrimazole for three weeks is effective (Silva *et al.*, 1998:213).

Ketoconazole is effective as an oral treatment (Silva *et al.*, 1998:211). Oral ketoconazole 200 mg daily for 7 days or 400 mg single dose cures most of the patients in the short-term (Berger, 2003:99; Silva *et al.*, 1998:203). The agent itraconazole 200 mg daily for a week is an effective treatment (Silva *et al.*, 1998:213).

2.18.5. ONYCHOMYCOSIS (TINEA UNGIUM)

Onychomycosis is a fungal infection of the finger or the toe nails which is very difficult to cure (Skin site, 2003c). This disease is when finger nails or toe nails thicken, discolour, become disfigured and split (Podiatry channel, 2005). According to Doctorfungus (2005) onychomycosis refers to the invasion of the nail plate by a fungus.

Risk factors for onychomycosis are genetics, increased age, family history, poor general state of health, frequent nail trauma, environmental contact with pathogens, warm, humid climate, fitness popularity, occlusive clothing and shoes, immunosuppression and *Tinea pedis* prevalence (Elewski, 2000:21).

2.18.5.1. ETIOLOGY

Onychomycosis accounts for one third of fungal skin infections (Rodgers & Bassler, 2001:663). The presentation of this disease varies among different populations (Doctorfungus, 2005).

There are mainly three causes of dermatophytes, yeast and nondermatophyte molds (Blumberg *et al.*, 2005). The possible causes are *Trichophyton rubrum, T. interdigitale* also known as *Tinea ungium* (DermNet NZ, 2005b; Podiatry channel, 2005). This organism is a dermatophyte, a fungus that infects hair, skin and nails (Podiatry channel, 2005). *Candida albicans* and moulds especially *Scopulariopsis brevicaulis* can also occur (DermNet NZ, 2005b).

This infection may involve any component of the nail, including the nail matrix, the nail bed or the nail plate (Blumberg *et al.*, 2005).

It usually results from untreated *Tinea pedis* or *Tinea manuum* and can also follow when the nail has been injured (DermNet NZ, 2005b).

2.18.5.2. CLINICAL PRESENTATION

It may affect more than one toenail and finger nail and usually it involves the great toe nail or the little toe nail (Blumberg *et al.,* 2005; DermNet NZ, 2005b). Without treatment the nail becomes so thick that is presses against the inside of a shoe, causing pressure, irritation and pain (Podiatry channel, 2005).

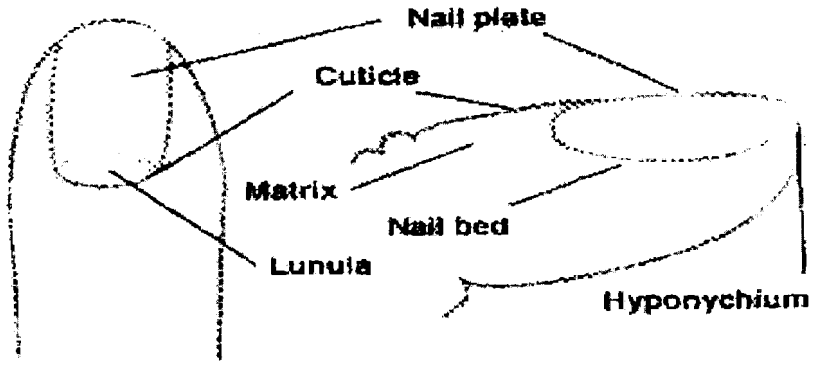


Figure 2.5: Anatomy of the nail unit (Doctorfungus, 2005).

Usually there are no symptoms, but occasionally it can cause pain or discomfort (eCure Me, 2003). It is not a life threatening infection but can cause pain, discomfort and often serious physical and occupational limitations (Blumberg *et al.,* 2005; Elewski, 2000:20). The nail is brittle, thickened and dull (eCure Me, 2003). *Tinia unguium* is a fungal infection of the nail bed, matrix or plate (Rodgers & Bassler, 2001:663).

It presents in different patterns. Lateral onycomycosis shows white or yellow opaque streaks that appear at one side of the nail. Subungual hyperkeratosis includes the development of scales and occurs under the nail. Distal onycholysis is when the end of the nail lifts up and the free edges often crumble (DermNet NZ, 2005b). Distal onychomycosis is the most common form and it can develop in the toenail, fingernail or both (Doctorfungus, 2005; Rodgers & Bassler, 2001:663). Superficial white onychomycosis includes flaky white patches and pits appear on the top of the nail plate (DermNet NZ, 2005b). The toenail is usually affected and the fungi that cause it directly invade the superficial layers of the nail plate and form well-delineated "white islands" on the plate (Doctorfungal, 2005; Rodgers & Bassler, 2001:663). Proximal

onychomycosis includes white or yellow spots that appear in the half-moon (DermNet NZ, 2005b). It is the least common *Tinea ungium* and it occurs when the fungi invade the nail through the proximal nail fold, penetrating the newly formed nail plate and then migrating distally (Doctorfungal, 2005; Rodgers & Bassler, 2001:664). The toenail and the fingernail are equally affected (Rodgers & Bassler, 2001:664).

Candida infection of the nail plate generally starts near the nail fold; the nail fold is swollen and red, lifted off the nail plate (DermNet NZ, 2005b). It usually develops when the nail has previously been damaged by infection or trauma and more often infects the fingernail (Rodgers & Bassler, 2001:665). White, yellow, green or black marks appear on the nearby nail and spread (DermNet NZ, 2005b).

2.18.5.3. COMPLICATIONS

Sometimes the surrounding skin can become infected and cause cellulites (eCure Me, 2003; Elewski, 2000:19). With skin injury the nail may colonise, thereby increasing infectious complications (Blumberg *et al.*, 2005). According to Elewski (2000:19) complications are bacterial infection, pain and extensive dermatophytic infections.

2.18.5.4. TREATMENT

It is difficult to treat onychomycosis because the nail grows slow and receives very little blood supply (Podiatry channel, 2005). The fingernail infection is usually quicker cured than toenail infection (DermNet NZ, 2005b; eCure Me, 2003; Rodgers & Bassler, 2001:665). If the fungus gets into the nail it is very difficult to treat (Skin site, 2003c).

It is difficult to treat because one has to take medication for a very long time (eCure Me, 2003). The standard treatment of monychomycosis consists of monotherapy with griseofulvin or ketoconazole (Elewski, 2000:23).

In less severe cases naftifine gel or ciclopirox lotion can be effective (Blumberg *et al.*, 2005; eCure Me, 2003). Ciclopirox solution 8% and innovative nail lacquer have recently been approved for the treatment of mild to moderate onychomycosis (Doctorfungal, 2005).

Usually anti-fungal treatment must be taken orally and the choices include ultramicrosize griseofulvin (6 months), itraconazole (3 months), fluconazole (6 months) and terbinafine (6 weeks) (eCure Me, 2003; Rodgers & Bassler, 2001:665; Skin site, 2003c). Itraconazole, fluconazole and terbinafine penetrate the nail matrix rapidly and remain there for a prolonged period of time (Elewski, 2000:23). Griseofulvin is for the treatment of superficial fungal infections of the skin, nails and hair (Pardasani, 2000:270).

Terbinafine is an allylamine anti-fungal agent that is active against dermatophytes and is less effective against nondermatophytes, including *candida* species (Blumberg *et al.,* 2005; Doctorfungal, 2005; Pardasani, 2000:273; Rodgers & Bassler, 2001:666; Skin site, 2003c).

Itraconazole is a broad-spectrum antifungal agent that can be used against dermatophytes, many nondermatophytes and *candida* species (Elewski, 2000:23; Rodgers & Bassler, 2001;666). possible interactions that may occur with this drug have to be taken into account (Blumberg *et al.,* 2005; Doctorfungus, 2005; Rodgers *et al.*, 2001:666).

Fluconazole is active against dermatophytes, *candida* species and some nondermatophytes molds (Blumberg *et al.,* 2005; Doctorfungal, 2005; Elewski, 2000:23; Rodgers & Bassler, 2001:667).

Ketoconazole was the first significant broad-spectrum oral imidazole effective against fungal infections, but there must be good control because fatal toxic hepatitis can occur (Pardasani, 2000:271).

Griseofulvin and fluconazole are not very good choices for toenail infections (eCure Me, 2003).

2.19. IMPETIGO

The definition of impetigo refers to a skin infection caused by bacteria. It is most common in children and is contagious (DermNet NZ, 2004b; National skin centre, 2002d; Skin site, 2003a).

2.19.1. ETIOLOGY

The *staphylococci* and the *streptococci* cause the infection impetigo which is contagious. By scratching it can be spread from one area to another (American medical association, 1997; Berger, 2003:108; Grinsted & Manniche, 2002; Mayo Clinic, 2004; Nemours foundation, 2002).

It is a superficial infection of the skin and is common in pre-school children and young adults (American medical association, 1997; National skin centre, 2002e). It usually affects the area around the nose and the mouth but it can affect skin anywhere on the body (American medical association, 1997; Nemours foundation, 2002).

2.19.2. CLINICAL PRESENTATION

A rash appears four to ten days after exposure and the rash looks red, round and may be oozing (Maryland department of health and mental hygiene, 2002; Mayo Clinic, 2004).

Impetigo forms round, crusted, oozing spots that grow larger day by day. The hands and face are the favourite locations for impetigo, but it often appears on other parts of the body (Grinsted & Manniche, 2002; Mayo Clinic, 2004; National skin centre, 2002e; Nemours foundation, 2002; Skin site, 2004).

The infection is most often in the face although it can affect the skin anywhere. The only symptoms are itching and tiny blisters usually around the nose and mouth (American medical association, 1997; Berger, 2003:108; Grinsted & Manniche, 2002; Mayo Clinic, 2004). The lesions have macules, vesicles, bullae, pustules and honey-coloured crusts and when these are removed it leaves red areas (Berger, 2003:108; Park, 2005).

The infection appears as skin blisters that break down and become sores with golden-yellow crusts on the surface (National skin centre, 2002e; Park, 2005). A deeper form of impetigo is ecthyma usually caused by the *streptococci* or the *staphylococci* and this form can leave ulceration and scarring (Berger, 2003:108).

2.19.3. COMPLICATIONS

It is important to receive treatment because the condition can lead to a serious complication namely nephritis (Maryland department of health and mental hygiene, 2002). According to Mayo Clinic, (2004) the complications are post-streptococcal glomerulonepritis, meningitis and cellulites.

2.19.4. TREATMENT

The treatment depends on the severity of the infection (DermNet NZ, 2004b). The systemic antibiotics are more effective than the topical antibiotics (American medical association, 1997; Berger, 2003:109). The systemic antibiotics include dicloxacillin or cephalexin that are usually effective, as an alternative erythromycin can help if there is no resistance (Berger, 2003:109; Grinsted & Manniche, 2002; Park, 2005). It is a nasal carriage organism and mupirocin must be administrated in the nose (Berger, 2003:109; DermNet NZ, 2004b). Mupirocin can also be used on the affected areas (Berger, 2003:109; Grinsted & Manniche, 2002; Mayo Clinic, 2004).

Cover the infected areas with gauze and tape and cut the person's fingernails to prevent spreading of the infection. The healing should begin within three days after antibiotics have been started (American medical association, 1997).

The patient should have good hygiene and have separate towels and linen meant for the affected person only (Maryland department of health and mental hygiene, 2002).

2.20. CHAPTER SUMMARY

In this chapter the different dermatological diseases that are relevant to this study were described. The etiology, complications and treatment of the diseases were referred to. In the next chapter aspects of health care: disease management will be discussed.

CHAPTER 3
ASPECTS OF MANAGED HEALTH CARE

In this chapter managed health care concepts will briefly be looked at. The disease management components will be discussed under the following topics: Pharmaco-economics, drug utilisation review, pharmaco-epidemiology and evidence based medicine.

3.1. INTRODUCTION

"Managed health care is on continuum, with a number of plan types offering an array of features that vary in their abilities to balance access to care, cost, quality control, benefit design and design flexibility. Managed care plans evolve, with features from one type of plan appearing in others and new features continually being developed. There is no single definition of the term managed care that has endured in the past or will survive in the future" (Wagner, 1997:702).

Managed health care systems and pharmacy benefit management companies have the responsibility of managing the medication use of hundreds of thousands to millions of patients (Weber, 1999). It also facilitates rational use of drugs in populations (Sjöqvist & Birkett, 2003:78).

3.2. RELATIONSHIP BETWEEN HEALTH CARE CONCEPTS

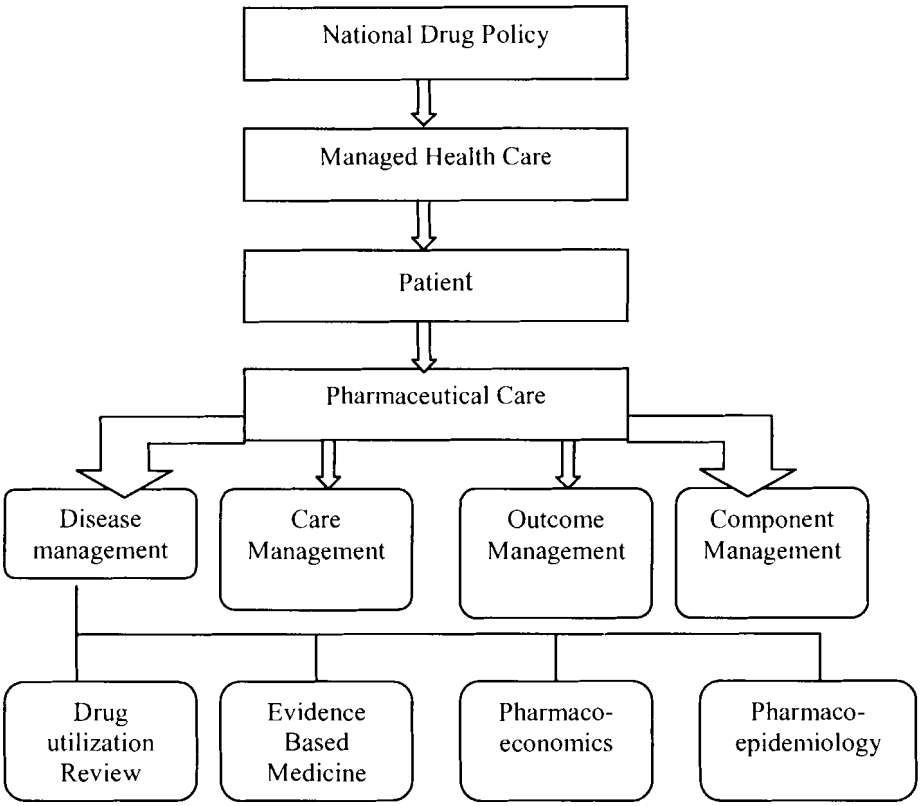


Figure 3.1: Relationship between different health care concepts (Serfontein, 2000:22).

The different health care concepts will be described briefly under each inscription.

3.2.1. MANAGED HEALTH CARE

It is a system that controls the financing and delivery services to members who are enrolled in a specific type of healthcare plan (American heart association, 2005).

A more complete discussion follows in paragraph 3.3.

3.2.2. PHARMACEUTICAL CARE

Pharmaceutical care is the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life (Hepler & Strand, 1989:S7).

A complete discussion follows in paragraph 3.4.

3.2.3. DISEASE MANAGEMENT

Disease management is defined as a proactive, coordinated approach to medical care delivery (Tremonti, 1998). According to Labiris (2003:168) disease management is the systematic, population-based approach to identify people's risk, intervene with specific programmes of care and measure clinical and other outcomes.

There are three primary elements of disease management:

- Knowledge base that quantifies the economic structure of the disease and describes guidelines for discrete patient segments.
- A delivery system of health care professionals and organisation closely coordinating to provide care throughout the course of a disease.
- A continuous improvement process that measures clinical behaviour refines treatment standards and improves the quality of care provided (Tremonti, 1998).

3.1.1.1. DRUG UTILISATION REVIEW

Drug utilisation review is a structured process used to access the quality of drug therapy by engaging in the evaluation of data on drug prescribing, dispensing and / or patient use in a given health care environment against predetermined agreed upon criteria and standards. If therapy is determined to be inconsistent with the agreed criteria and standards, specific actions may be needed with specific patients and / or providers to optimise drug therapy (Guo *et al.*, 1995:1175).

The complete discussion follows in paragraph 3.5.

3.1.1.2. EVIDENCE BASED MEDICINE

Evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients (Gambrill, 1999:2).

Discussed more circumscriptively in paragraph 3.6.

3.1.1.3. PHARMACO-EPIDEMIOLOGY

It is the study of the use and effects or side effects of drugs in large numbers of people with the purpose of supporting the rational and cost-effective use of drugs and improving health outcomes (Sjöqvist & Birkett, 2003:77).

A more complete circumscriptive discussion follows in paragraph 3.7.

3.1.1.4. PHARMACO-ECONOMICS

Is the description and analysis of the cost of drug therapy to a health care system and society. It identifies, measures and compares the cost and consequences of pharmacoeconomical products and services (Bootman *et al.,* 1991:4).

A complete description follows in paragraph 3.8.

3.2.4. CASE MANAGEMENT

Case management is defined as a collaborative process that accesses, plans, implements, coordinates, monitors and evaluates the options and services required to meet an individual's health needs, using communication and available resources to promote quality and cost-effective outcomes (Cudney, 2002:149).

Case management is the process of coordinating health care by planning; facilitating and evaluating interventions across levels of care to achieve measurable cost and quality outcomes. It refers to the coordination of patient care to ensure appropriate care and reductions in cost of providing services. It involves delivering care across traditional professional boundaries (Zander, 2002:65).

The focus of case management is the coordination of health and human services (Cudney, 2002:149).

3.2.5. OUTCOME MANAGEMENT

Outcome management is the collecting and analysing results of medical performance and using that information to optimise health care results (Lewis, 1994:8). It is further a continuous process linking health outcomes to medical care provided in order to predict outcomes; improve outcomes, and provide a rational basis for decision making by payers, providers and patients (Lewis, 1994:9).

3.2.6. COMPONENT MANAGEMENT

Component management shifts costs from prescription drugs to other areas of the health care system. It often shifts the costs from the pharmaceutical component to other areas of the system, increasing the total health care spending (Levy & Cocks, 1999).

Relative formularies have been one of the most common cost containment strategies of managed care plans, but it was found that formulary restrictions increases the use of other health care services. These cost containment efforts not only fail to save money but may also be harmful to the patient (Levy & Cocks, 1999).

3.3. MANAGED HEALTH CARE

3.3.1. INTRODUCTION

Managed care is fundamentally a shift in power and control of health care systems from physicians to organisational purchasers and managed care organisations (Grembowski *et al.*, 2002:1168).

3.3.2. DIFFERENT DEFINITIONS OF MANAGED HEALTH CARE

Managed health care would include any kind of health care services which are paid for, all or in part by a third party, including any government entity and for which the focus of any part of clinical decision making is other than between the practitioner and the client or patient (Cohen, 2003:34).

Managed health care attempts to create an organised system where care that is medically necessary is delivered by properly trained and educated health care professionals, in appropriate locations and facilities and under practice guidelines that are likely to produce the best results for patients (Shoaf, 1999:242).

Managed care is the attempt to control health care spending by affecting the price paid for health care services, inserting economic incentives into the health care service delivery system for suppliers to hold down their cost, controlling or influencing consumer provider selection patterns, better coordinating services and exercising tighter control over consumer service utilisation (Shoaf, 1999:242).

3.3.3. OBJECTIVES

It offers new ideas and methods for improving system performance such as making providers accountable for their performance by linking their productivity to payment, introducing greater choice of providers into 'no-choice' public systems, and promoting the integration of health and social services – that countries can adopt to selectively reform their health care system (Grembowski *et al.,* 2002:1168).

According to Moses (1995:45) the following are some goals that are necessary to achieve:

- Cost-effectiveness
- Deliver high quality care in environment that manages or controls costs
- The care delivered is medically necessary and appropriate for the patient's condition
- Care is rendered by an employee with appropriate health care education
- Customer satisfaction

3.3.4. SOUTH AFRICAN PERSPECTIVE OF MANAGED HEALTH CARE

The following two statements illustrate the level view of managed health care:

Managed health care means an arrangement through which utilisation of health care is monitored through the use of mechanisms, which are designed to monitor appropriateness, promote efficacy, quality and cost-effectiveness of the delivery of relevant health services (Managed healthcare systems, 2006).

According to the Medical Schemes Act, Act 131 of 1998, managed health care means clinical and financial risk assessment and management of health care, with a view to facilitating appropriateness and cost-effectiveness of relevant health services within the constraints of what is affordable, through the use of rules-based and clinical management-based programmes.

3.4. PHARMACEUTICAL CARE

Pharmaceutical care encourages pharmacists to ensure that medication-related health outcomes are optimised (Farris & Schopflocher, 1999:55).

3.4.1. PHARMACEUTICAL CARE DEFINITION

Pharmaceutical care is the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life (Hepler & Strand, 1989:S7).

3.4.2. WHAT IS PHARMACUTICAL CARE?

Direct involvement of the pharmacist in the design, implementation and monitoring of a therapeutic drug plan to produce a specific therapeutic outcome (Helper & Strand, 1989:S7).

These outcomes include the following:

- Cure of disease
- Elimination or reduction of a patient's symptomatology
- Arresting or slowing of a disease process
- Preventing a disease or symptomatology (Hepler & Strand, 1989:S7).

The functions are identifying potential and actual drug-related problems, resolving actual drug-related problems and preventing drug-related problems (Hepler & Strand, 1989:S7).

3.5. DRUG UTILISATION REVIEW

An overview of the different types of drug utilisation review studies as well as what drug utilisation review is and why it is necessary, will be given.

3.5.1. INTRODUCTION

The goal of a drug utilisation review is to improve health care delivered to the beneficiary (Mixon, 2005).

Drug use is the total sum of knowledge, understanding, judgements, skills, constraints and ethics that assure optimum safety in distribution and use of medication (Guo *et al.*, 1995:1175).

Drug utilisation review includes an evaluation of therapy and intervention, where necessary, after the therapy has been started and may involve assessment of drug use in individual patients or analysis of prescribing and dispensing patterns (US pharmacopeia drug utilization review advisory panel, 2000).

In most cases the prescription data are submitted for drug utilisation review after the prescription has been dispensed. Thus it focuses largely on preventing recurrence of a problem and may serve to identify previous trends in drug use when developing future interventions to enhance drug use (Kralewski *et al.*, 1994:64).

3.5.2. DEFINITION

According to Guo *et al.* (1995:1175) drug utilisation review is defined as and authorised, structured and continuing programme that reviews, analysis and interprets patterns of drug usage in a given health care system against predetermined standards. Drug utilisation review (DUR) is an authorised, structured, ongoing review of practitioner prescribing, pharmacist dispensing and patient use of medication (Weber, 1999).

DUR is the process by which prescribed medications are evaluated against explicit criteria to improve the quality of drug therapy and reduce unnecessary expenditures (Mixon, 2005).

3.5.3. WHY DRUG UTILISATION REVIEW?

The purpose is to identify whether current patterns of prescribing, dispensing and use of drug therapy are consistent with criteria and standards. These standards demonstrate that the drug therapy is effective, safe, appropriate and cost-effective and support optimal patient outcomes (Guo *et al.*, 1995:1175).

Auditing a patient's medical charts and providing feedback have shown to reduce drug consumption and drug use rates and from here to reduce drug cost (Guo *et al.*, 1995:1176). Some have attempted to limit drug cost by limiting the number of prescriptions covered by the government or health insurer and another study of limiting access to medications for the elderly used pharmaceutical capitation as a method to control health care costs (Horn, 2003:35).

There are two main reasons for the need of drug utilisation review. Firstly, a considerable body of evidence indicates that current levels of prescribing and patient drug consumption are less than optimum and the second factor concerns the current expenditure and price increases of drugs (Kralewski *et al.*, 1994:61). Many beneficiaries will have greater access to prescription drugs and presumably will use more prescription medication than they do currently (Lyles, 2004:100; Horn, 2003:32).

Drug utilisation review is important to clinical research, identification of adverse drug reactions, economic and quality importance, the aging of the population as well as the access the patients have to certain drugs (Enright & Flagstad, 1991:1909).

The principal objective of drug utilisation research is to facilitate the rational use of drugs in populations. The rational use of a drug implies the prescription of a well-documented drug at an optimal dose, together with the correct information, at affordable price for the individual patient (WHO, 2003:9).

According to Idaho State University (2005) patient care and reduced cost can be accomplished in the following ways:

- Retrospective analysis of patient drug usage

- Identification and review of patient profiles
- Regular reporting of activities and important findings to Medicaid providers and pharmacies
- Preparation and distribution of educational leaflets
- Awareness campaigns for new pharmaceutical products and techniques
- Research studies into drug-related trends and applying those studies to cost-saving plans.

DUR policies could have a negative impact on the use of effective and essential medications among the low-income population (Blais *et al.*, 2003:164; Lurk, 2004:267).

The objectives of drug use evaluation include the following:

- Ensuring that drug therapy meets current standards of care
- Controlling drug cost
- Preventing medication-related problems
- Evaluating the effectiveness of drug therapy
- Identification of areas of practice that require further education of practice (Sjöqvist & Birkett, 2003:81).

By participating in a drug utilisation evaluation programme one can improve quality of care for patients, individually and as a populations, by preventing the unnecessary or inappropriate drug therapy and preventing adverse drug reactions (US pharmacopeia drug utilization review advisory panel, 2000; Weber, 1999).

3.5.4. TYPES OF DRUG UTILISATION REVIEW STUDIES

Types of drug utilization studies:

- Cross-sectional studies - this data provide a 'snapshot' of drug use at a particular time
- Longitudinal studies - study the trends of drug use (it can be on total drug use as obtained from a claims database)

- Continuous longitudinal studies - usually at a practitioner where the individual patient is unique and drug where drug prescription can be followed (WHO, 2003:17).

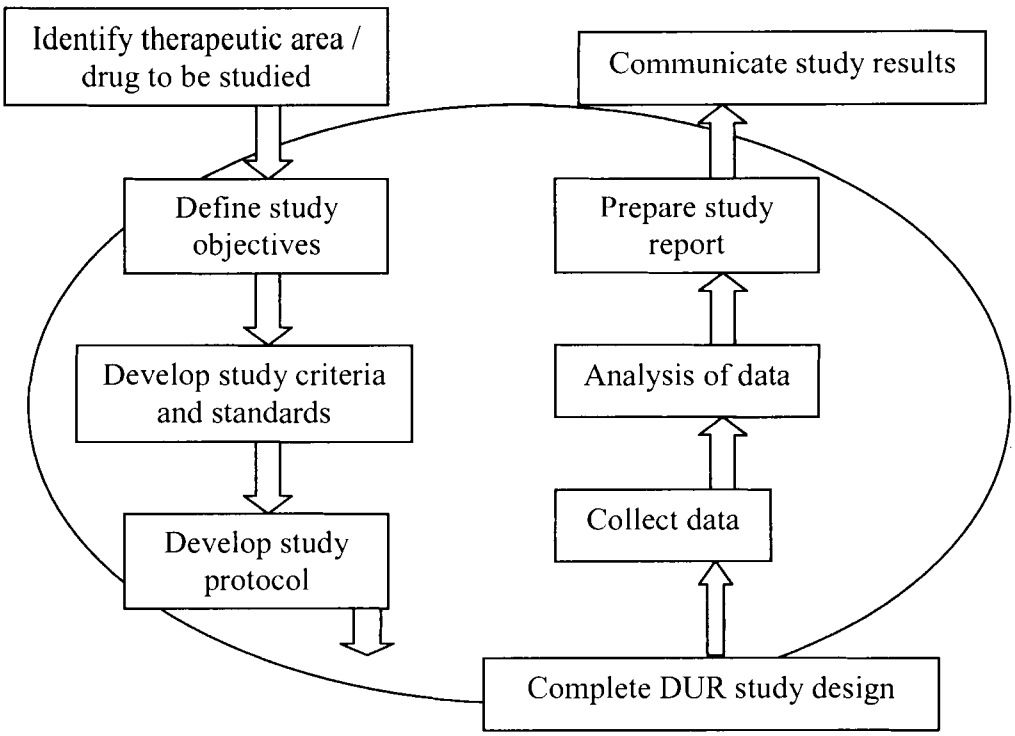


Figure 3.2: The process of a drug utilisation review study (Blackburn *et al.*, 2001:6).

3.4.4.1. PROSPECTIVE DRUG UTLISATION

The prospective study evaluates individualised or aggregate data on drug prescribing and / or dispensing prior to prescribing, in a given health care environment, against predetermined, and agreed upon criteria and standards (Blackburn *et al.*, 2001:7).

Prospective drug utilisation deals with inappropriate drug therapy, cost containment and models for prospective drug utilisation. Prospective drug utilisation review is initiated by the pharmacist, who reviews prescriptions at the point of sale for potential problems (Kidder & Bae, 1999:107).

In prospective drug utilisation review, abuse in prescription practices is cost-effectively detected, while providing the information critically to the dispensing providers for advising patients of appropriate prescription utilisation and contra-indications (UNISYS, 2006).

A prospective drug utilisation study can influence patients' treatment and outcomes (Blackburn *et al.*, 2001:7).

3.4.4.2. RETROSPECTIVE DRUG UTILISATION

A retrospective DUR study evaluates data on drug prescribing; dispensing and/or patient use after the drug has been dispensed, in a given health care environment against predetermined agreed upon criteria and standards (Blackburn *et al.*, 2001:7).

Retrospective DUR occurs after the patient has completed a course of therapy or while the patient is receiving long-term maintenance therapy (Guo *et al.*, 1995:1176). Retrospective drug utilisation is the easiest to perform since drug therapy is reviewed after the patient had received the medication (Weber, 1999).

3.4.4.3. CONCURRED DRUG UTILISATION

A concurred drug utilisation study evaluates drug dispensing, prescribing and/or patient use data at a point in time or intervals through acute or ongoing therapy and includes a timeframe from the onset (Blackburn *et al.*, 2001:8).

It is used to access long term or maintenance drug therapy at regular, periodic intervals but can also be used during acute therapy (Blackburn *et al.*, 2001:8).

Concurred drug utilisation studies can influence the course of drug therapy (Blackburn *et al.*, 2001:8).

3.5.5. DEVELOPMENT OF CRITERIA OF DRUG UTILIZATION

In general the goals of drug utilisation review can be identified as a description of the patterns of drug use in specific populations; the general analysis of the problem with regard to its importance, cause and consequences; the establishment of a weighted basis for decisions on problem solving; and the assessment of the effects of the action taken (Björnson *et al.*, 1998:132).

DUR includes an evaluation of therapy and intervention, where necessary, after the therapy has been started and may involve assessment of drug use in individual patients or analysis of prescribing and dispensing patterns (US pharmacopeia drug utilization review advisory panel, 2000). The criteria reviewed in retrospective studies include the following:

- Evaluation of indications
- Monitoring use of high-cost medicines
- Comparison of prescribing between physicians
- Cost to patient
- Adverse drug reactions
- Drug interactions (WHO, 2003:24)

There is an interest in shifting retrospective DUR to include disease management concepts and this will help improve the effectiveness and efficiency of pharmacists' health care interventions (US pharmacopeia drug utilization review advisory panel, 2000).

The DUR programme is to emphasise the patient's safety by an increased review and awareness of prescribed drugs (Owens, 2005). The overall cost of drugs must be reduced; as well as patient care that must be improved (Idaho State University, 2005).

According to Weber (1999) the following five steps are essential when conducting any quality-related drug utilisation evaluation programme:

- Identify or determine optimal use
- Measure actual use
- Compare
- Intervene
- Evaluate the drug utilisation programme.

3.5.6. DRUG UTILISATION METHODS

There are two methods to be briefly described, namely the prescribed daily dose (PDD) and the defined daily dose (DDD).

3.5.6.1. PRESCRIBED DAILY DOSE

It is the average daily dose prescribed for the main indication (WHO, 2003:14).

The PDD can be determined from studies of prescriptions or medical records and it is important to relate the dose to diagnosis on which the dose is based (Truter, 2001:39; WHO, 2003:39). It is important to note that the PDD does not necessarily reflect the actual drug utilisation (WHO, 2003:39).

3.5.6.2. DEFINED DAILY DOSE

The definition of DDD is the assumed average maintenance dose per day for the drug used for its main indication in adults (Sjöqvist and Birkett, 2003:83; WHO, 2005).

Drug utilisation figures should be given as numbers of DDDs /1000 inhabitants / day or DDDs / 100 beds / day or DDDs / inhabitants / day (Sjovist & Birkett, 2003:84).

It can be calculated as follows according to Wikipedia the free encyclopedia (2005):

$$\text{Drug usage (DDD's)} = \frac{ItemsIssued \times AmountOfDrugPerItem}{WhoDDDMeasure} \qquad \textbf{Equation 1}$$

The purpose of DDD is to serve as a tool for the utilisation research in order to improve quality of drug use (WHO, 2005).

In order to measure drug use it is important to have both a classification system and units of measurement (WHO, 2005). The initial recommended dosage of prescription drugs is often twice that needed for safe and effective use (Stephenson, 2002:1578).

In the classification system the drugs are divided into different groups according to the organ or system on which they act. Medical products are classified in their main therapeutic use of the main active ingredient and can also have different codes for different strengths (WHO, 2005).

3.6. EVIDENCE BASED MEDICINE

This is a measurement that is daily becoming more important, to illustrate the benefit and that the cost of the product is necessary (Williams, 2001:275).

3.6.1. INTRODUCTION

Evidence based medicine is the concept of formalising the scientific approach to the practice of medicine for identification of "evidence" to support clinical decisions (Williams, 2001:275). It is an approach to practice and teaching that integrates pathophysiological rationale, caregiver experience and patient preferences with valid and current clinical research evidence (Ellrodt & Cook, 1997:1687).

It involves integrating clinical expertise with the best available external evidence from systematic research as well as considering the values and expectations of clients (Gambrill, 1999:2).

According to Kleinman, (1998:350) the practice of medicine is moving towards evidence based medicine and this trend has the potential to be progressive or restrictive depending on how it is implemented.

3.6.2. STEPS IN DEVELOPING AN EVIDENCE BASED MEDICINE PROGRAMME

The first step is to formulate a clear definition of the disease, its scope, and its impact over time using a multidisciplinary team. Secondly to develop comprehensive baseline information to

understand current health care delivery and resource utilisation. The third step is to generate specific clinical and economic questions and search the literature. Fourthly, critically appraise and synthesise the evidence. Step number five is to evaluate the benefits, harms and cost. The sixth step is to develop evidence-based guidelines, clinical pathways and algorithms. Seventhly, is to create a system for process and outcome measurement and reporting. The eighth step is to implement the evidence-based guidelines, pathways and algorithms. The last step is to complete the quality improvement cycle (Ellrodt & Cook, 1997:1687).

3.7. PHARMACO-EPIDEMIOLOGY

Pharmaco-epidemiology is the study, the use of and the effects of drugs in large numbers of people (Strom, 2005:3).

3.7.1. INTRODUCTION

Pharmaco-epidemiology as a specific field, which is primarily concerned with studies of adverse drug effects (Strom, 2005:4).

The mission of pharmaco-epidemiology is to enhance society's ability to use medicine in an optimally effective manner and by extension to limit or prevent the occurrence of drug usage problems (Waning & Montagne, 2001:4). Pharmaco-epidemiology can be used to shed light on the pharmacokinetics of a drug (Strom, 2005:4). It may be drug orientated, emphasising the safety and effectiveness of individual drugs or groups of drugs (Sjöqivst & Birkett, 2003:77).

3.7.2. DEFINITIONS

Pharmaco-epidemiology is defined as the study of the use and effects or side effects of drugs in large numbers of people with the purpose of supporting the rational and cost-effective use of drugs in the population thereby, improving health outcomes (Sjöqvist & Birkett, 2003:77).

The term prevalence is defined as the number of existing cases of a disease or condition present in a defined population at one particular point in time (Waning & Montagne, 2001:5).

3.7.3. RESEARCH METHOD

Pharmaco-epidemiology applies the method of epidemiology to the content area of clinical pharmacology (Strom, 2005:15). The basic idea is to measure the source, diffusion, use, and effects of drugs in a population and to determine the frequency and distribution of drug use outcomes in that population (Waning & Montagne, 2001:5).

There are different study designs that can be used:

- A randomised clinical trial is the most expensive study but also the most convincing design
- Cohort study can study multiple outcomes; uncommon exposure and it can take years to finish such a study
- Case-control study can also study multiple outcomes, but also uncommon diseases and is less expensive, easier and faster to achieve
- Analysis of secular trends can give rapid answers
- Case-series study is useful in quantitation of incidence
- Case reports are the cheapest and easiest method for generating hypotheses (Strom, 2005:20).

The studies are performed to (1) describe current problems of drug use in a specific population; (2) determine changes in drug use over time; (3) measure the effects of information, education, promotional activities, media accounts and price of drug use; (4) detect inappropriate drug use associated problems; (5) estimate drug needs in terms of disease patterns and outbreaks; and (6) plan the selection, supply and distribution of drugs (Waning & Montagne, 2001:5).

Table 3.1: Advantages and disadvantages of pharmacoepidemiological methods (Strom, 2005:20).

STUDY DESIGN	ADVANTAGES	DISADVANTAGES
Case reports	Inexpensive and easy method for generating hypothesis	Cannot be used for hypothesis testing
Analysis of secular trends	Can provide rapid answers	No control or confounding
Case-control studies	Can study multiple exposures Can study uncommon exposures Logistically easier and faster Less expensive	Control selection problematic Possibly biased exposure data
Cohort study	Can study multiple outcomes Selection bias likely Unbiased exposure data Incidence data Available	Possible biased outcomes data More expensive If done prospectively, may take years to complete
Randomised clinical trial (experimental study)	Most convincing design Only design which controls for unknown or immeasurable cofounder	Most expensive Artificial Logistically most difficult Ethical objections
Case-series	Easy quantitation of incidence	No control or confounding

3.7.4. APPLICATIONS IN PHARMACO-EPIDEMIOLOGY

In the public health perspective, epidemiology is the primary approach for identifying and describing the occurrence and development of disease. In a population pharmaco-epidemiology is the study of disease prevalence and transmission and the study focuses on the distribution and determination of the disease (Waning & Montagne, 2001:1).

Examples of epidemiology applied to drug use include adverse drug reaction reporting, surveillance study and clinical drug trials (Waning & Montagne, 2001:2). Skin reactions are among the most frequently reported adverse drug reactions (Van der Linden *et al.*, 1998:703).

3.8. PHARMACO-ECONOMICS

In this section at the different aspects of pharmaco-economics will be discussed.

3.8.1. INTRODUCTION

Health economics aims to define the cost and benefits of medical interventions, in such a way to support decisions about whether a health services should invest in particular activities (Walley, 1999:S3).

The economical aspects of medical interventions are becoming more important because of the health care expenditures that are increasing dramatically (Ellis *et al.*, 2002:271; Marchetti *et al.*, 1998:865). In a disease like psoriasis it is a life long care that is required, which translates into a lifelong expense for such a patient (Marchetti *et al.*, 1998:851).

There is a worldwide recognition of the need to control the rising cost of health care (Jessop *et al.*, 2002:568). The fields of economic and clinical medicine are rapidly moving towards the common goal of cost-effectiveness in medical practice (McCombs, 1998:112S). Economic pressures on health expenditures demand that costs be controlled, because of the unwillingness of today's society to pay for every aspect of medical care (Ellis *et al.*, 2002:271; Jessop *et al.*, 2002:568).

With the rising costs and high public expectations, there is a need to establish the most effective method of achieving quality of life (Jessop *et al.*, 2002:570). Therefore a need for value-related information and research has emerged (Ellis *et al.*, 2002:271). In the United Kingdom (UK) financial and managerial constraints have resulted in the rationalisation of dermatology inpatient services (Ayyalaraju *et al.*, 2003:249).

The rising costs of health care have stretched national health budgets around the world, often leading to limitation of services (Walley, 1999:S3).

Assessing the true cost to a health system of using a specific drug will therefore require the cost of acquisition of the drug to be balanced against both any cost savings resulting from the use of that drug and the extra health benefits it may produce (WHO, 2003:26).

Cost-effectiveness studies are increasing in importance as means for justifying expenses on health interventions and guides for making treatment and resources allocation decisions (Ellis *et al.*, 2002:271; Marchetti *et al.*, 1998:852). Cost-effectiveness analysis compares the clinical effects of alternative therapies to their net cost and broadly describe all types of cost studies (Ellis *et al.*, 2002:271; McCombs, 1998:112S).

The treatment used in dermatology must not only provide value, the value must be documented to justify spending money (Ellis *et al.*, 2002:271). The management of adverse events can lead to more expenses for the patient that can make the disease-free day more costly (Marchetti et al., 1998:851).

3.8.2. DEFINITION OF PHARMACO-ECONOMICS

Pharmaco-economics is the description and analysis of the cost of drug therapy to health care systems and society. It identifies, measures and compares the cost and consequences of pharmaco-economical products and services (Bootman *et al.*, 1991:4).

Economic evaluation applies to drug therapy or pharmacist services (Vogenberg, 2001:3).

3.8.3. REASONS FOR APPLICATIONS OF PHARMACO-ECONOMICS

In developing countries, health care costs have risen faster than general inflation. The factors behind the rise in health care costs are increasing morbidity, technological advances and greater demand for health care from better-educated patients (Walley, 1999:S3).

The benefits of more efficient or effective management of a disease include the following:

- The reduction in the number of initial and follow-up visits

- Reduction in the number, frequency and duration of therapeutic interventions
- Delay in the movement of patients from less expensive to more expensive forms of care (Marchetti *et al.,* 1998:852)

The quality of life is of crucial importance in many economic studies (Ellis *et al.*, 2002:280). It is also known that personal and socio-economic factors can have an influence on health-related quality of life (Jobanputra & Bachmann., 2000:826). Dermatological diseases are seldom fatal, pose a significant prevalence, morbidity and cost to the nation (Dehkharghani *et al.,* 2003:592).

A compelling reason to use health economics in dermatology or any other medical discipline is that the third party payers will demand evidence of value of interventions. The use of new methods of evaluation such as quality of life, allows comparison across different areas of medicine so that the true value of under-resource areas such as dermatology can be compared to that of glamorous areas (Walley, 1999:S4).

The economic analysis in health care is growing in importance and is emerging in dermatology. The economic analysis can provide guidance for making treatment decisions in justifying expenses in particular diseases (Ellis *et al.*, 2002:282). A formulary system can help health care providers in the evaluation, appraisal and selection of drugs (Suh *et al.,* 2002:161).

In dermatology consultation is often necessary to provide appropriate patient care, but it can be difficult due to geographic distribution of dermatologists for the patient to reach such a person (High *et al.,* 2000:776).

In some dermatological diseases the impact on a person can be so great that such a patient can develop anxiety and depression that can also have a financial impact (Jobanputra & Bachmann, 2000:830). The budget must be directed towards improved living standards and the control of major infectious diseases (Jessop *et al.,* 2002:568).

3.8.4. COMMON TYPES OF STUDIES IN PHARMACO-ECONOMICS

There are 5 related types of economic evaluation analysis in health care:

- Cost-minimisation analysis
- Cost-effectiveness analysis
- Cost-benefit analysis
- Cost-of-illness analysis
- Cost-utility analysis (Ellis *et al.*, 2002:273).

3.8.4.1. COST-MINIMISATION ANALYSIS

Cost-minimisation analysis (CMA) is when costs are analysed and compared where two or more interventions have been demonstrated or assumed to be equivalent in terms of the outcome or consequence. For example the evaluation of two generic equivalent drugs in which the outcome has proved to be equal. However the acquisition and administration cost of the two drugs may be significantly different (Bootman *et al.*, 1991:7).

It compares the cost of interventions that yield the same result, with the intent of identifying the intervention that has the lowest cost (Ellis *et al.*, 2002:274; WHO, 2003:26).

In psoriasis a CMA study might evaluate two immunosuppressive agents with identical efficacy in psoriasis treatment, the one would be less expensive, but it might require more frequent visits to the physician or laboratory. A CMA study would determine all costs associated with each of the treatments to determine which were the least expensive assuming equal outcomes (Ellis *et al.*, 2002:274).

This method is used to compare generic and innovator drugs that have shown to be equivalent in dose and therapeutic effect (WHO, 2003:26).

3.8.4.2. COST-EFFECTIVENESS ANALYSIS

Cost-effectiveness analysis (CEA) is when the cost and consequences are simultaneously measured; effectiveness in terms of obtaining a specified objective and cost in monetary terms (Bootman *et al.*, 1991:4). A generic term for economic evaluation also refers to a specific method of analysis (Vogenberg, 2001:3). CEA is designed to assist a decision maker in identifying a preferred choice among possible alternatives (Bootman *et al.*, 1991:6).

Cost-effectiveness analysis involves a more comprehensive look at drug cost (WHO, 2003:26). This allows for the comparison across interventions with varying outcomes and this is accomplished through the selection of a standardised measure of effectiveness (Ellis *et al.*, 2002:274).

When a treatment is more effective but also more expensive, CEA helps quantify the clinical and economic consequences of using it (Ellis *et al.*, 2002:274). CEA may be measured in terms of clinical outcomes such as number of lives saved, complications prevented or diseases cured and this may justify the cost of the treatment (WHO, 2003:26).

CEA is often used to examine alternative therapies for a single disease. The incremental cost-effectiveness ratio refers to the amount of money needed to produce an additional benefit (Ellis *et al.*, 2002:275).

	Strategy 1< Strategy 2	**Strategy 1> Strategy 2**
Strategy 1>	Strategy 1 dominant;	Incremental cost-
Strategy 2	Cost-effectiveness study	effectiveness study useful
	Unnecessary	
Strategy 1<	Incremental cost-	Strategy 2 is dominant;
Strategy 2	effectiveness study	cost-effectiveness study
	Useful	unnecessary

$$\textbf{Cost Effectiveness ratio} = \frac{Cost(strategy) - Cost(strategy_2)}{Effect(strategy) - Effect(strategy_2)} \qquad \textbf{Equation 2}$$

Figure 3.3: Cost-effectiveness ratio (Ellis *et al.*, 2002:275).

Steps for performing a cost-effectiveness analysis include the following:

- Calculate cost of therapy including as many costs as possible, both direct and indirect
- Study the effectiveness and provide results
- Calculate for average cost effectiveness
- Calculate incremental cost-effectiveness
- Determine, usually by interviews or surveys, the quality of life during and after each of the therapies
- Calculate quality-adjusted-life-years
- Calculate incremental cost-utility (Ellis *et al.*, 2002:276)

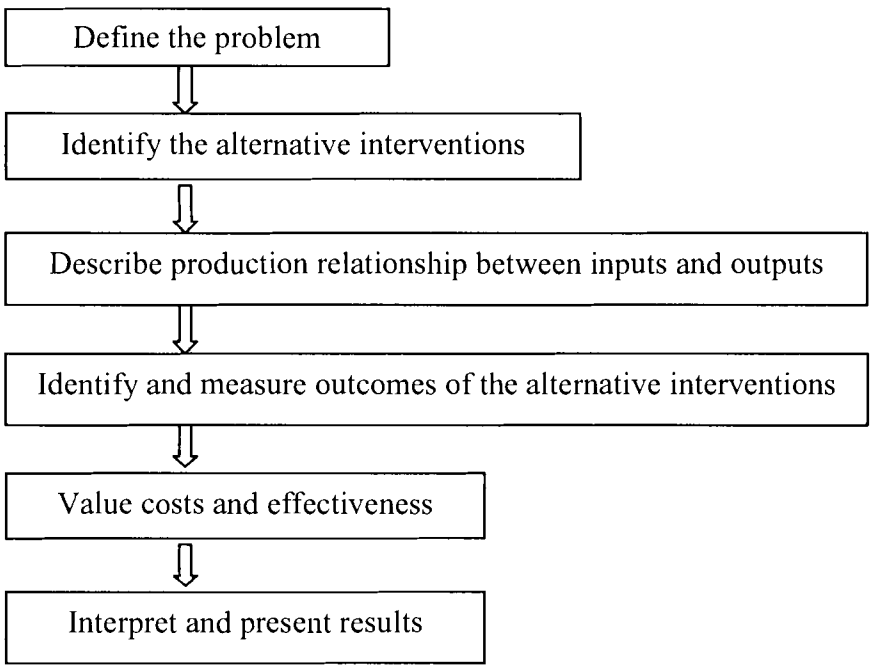


Figure 3.4: Basic steps of a cost-effectiveness analysis (Chrischilles, 1996:102).

In outcome measurement, cost-effectiveness analysis requires choosing a standard measure of effectiveness; this may be measured in years of life saved or number of patients successfully treated. There can be several shortcomings in this study for example, in controlled trials in a controlled environment on specific patients and specific treatment of a pharmaceutical intervention the results might not apply to daily clinical practice (Ellis *et al.*, 2002:280).

3.8.4.3. COST-BENEFIT ANALYSIS

Cost-benefit analysis (CBA) is when cost and consequences are simultaneously measured in terms of dollars. It improves the decision-making process in allocation of funds to health care and other programmes (Bootman *et al.*, 1991:5). CBA is a type of clinical evaluation of the outcome from a programme or intervention, the outcome being measured in monetary terms by net benefit (Total benefit – Total cost) (Vogenberg, 2001:21; WHO, 2003:27).

CBA attempts to overcome the inability to compare various results by translating outcomes into dollars. CBA is for making resource allocation decision across health care fields or across economic sectors (Ellis *et al.*, 2002:278).

The most desirable interventions are those, for which the benefits exceed the costs by the greatest margins. CBA of a single therapeutic programme can determine whether that programme is economically worthwhile in its own right. A worthwhile programme is one in which the benefit exceeds the cost (Ellis *et al.*, 2002:278; WHO, 2003:27). There are two ways to measure the CBA and that is the life-years gained and the other is the willingness to pay for a quality of life benefit (WHO, 2003:27).

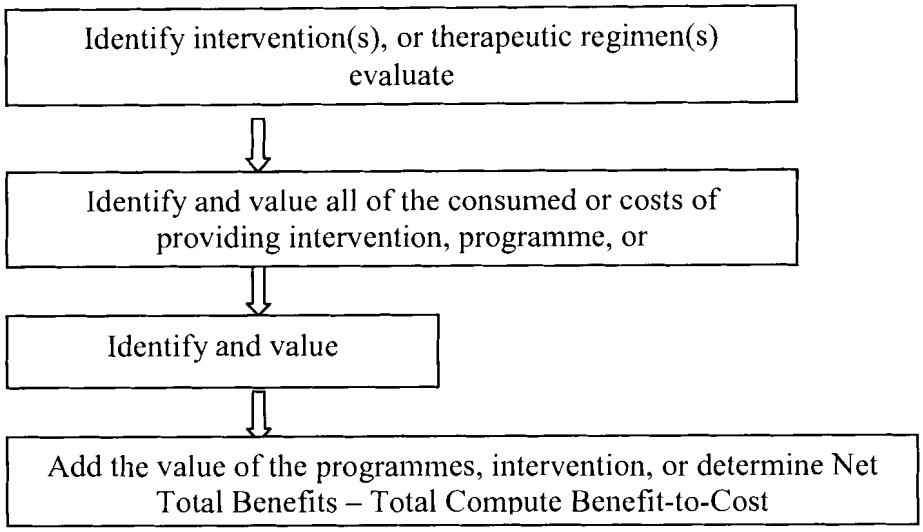


Figure 3.5: Steps in a cost-benefit analysis (McGhan & Kitz, 1996:70).

3.8.4.4. COST-UTILITY ANALYSIS

Cost-utility analysis focus on the consequences and these are measured in terms of quality of life, willingness to pay or preference of one intervention to another (Bootman *et al.,* 1991:4; WHO, 2003:27). It is an economic term in which the intervention consequence is measured in terms of patient preference or quality of health care outcomes and often the results are expressed in cost per quality-adjusted-life-year (QALY) (Bootman *et al.,* 1991:8).

Quality-adjusted-life-year (QALY) measures clinical effects if further refinement to measurement technique is achieved (McCombs, 1998:112S).

It is similar to cost-effectiveness analysis except that it incorporates a measure of quality into the outcomes of the interventions under study (Ellis *et al.,* 2002:276; WHO, 2003:27).

The measurement of quality is referred to as "utility". Utility is a concept used to describe individuals' preferences, including economic evaluations, expectancy of life or improved quality of life. The benefits are measured in quality of life and no longer in life years saved or years clear of disease (Ellis *et al.*, 2002:277).

It is difficult to measure CUA because every person's preferences may be different (Ellis *et al.*, 2002:277).

3.8.4.5. COST-OF –ILLNESS

Cost-of-illness evaluation identifies and evaluates the direct and indirect cost of a particular disease (Bootman *et al.*, 1991:5). It is a technique designed to identify the preferred choice among possible alternatives with equivalent outcomes or consequences by examining the cost associated with each of those alternatives (Vogenberg, 2001:24).

Cost-of-illness analysis (cost-consequence or cost-analysis study) is the most obvious form of economy-related health studies. An example of cost-of-illness analysis of psoriasis might add up the cost of drug acquisition, physician visits, laboratory studies and hospitalisation over time (Ellis *et al.*, 2002:273).

In the USA the annual cost of psoriasis is estimated at $1.5 billion. The annual cost of treating atopic dermatitis in the UK in percentage is for the patient 61 % (£250) and cost of the National Health Services is 39 % (£194) (Ellis *et al.*, 2002:274).

It must also be noted that there cannot be a comparison among treatments by means of cost-of-illness analyses because no consideration is given to the relative effectiveness of each of the therapies. Without considering treatment outcomes, cost information can be misleading as a guide to resource allocation decisions (Ellis *et al.*, 2002:273).

The cost of an illness is the sum of the medical resources used to treat the illness (hospital care, professional services, drugs and supplies); the non-medical resources associated with it (transport, lodging for the family during treatment and hiring a person to help with home care); and the loss of productivity due to illness or disability (indirect cost) (Struwig, 2001:60).

3.8.5. APPLICATION OF PHARMACO-ECONOMICS IN DERMATOLOGY

Measurement in quality of life has an important role as part of the benefit side of an economic evaluation, where it can be used to compare the benefits of different treatments in different diseases; this can be used to argue for more resources for dermatology (Walley, 1999:S5).

It is generally recommended that the perspective of society be taken into account. It determines which cost and which benefits will be included in the analysis and which will have a significant influence on measured cost and benefit (Ellis *et al.*, 2002:278).

Identify and define the problem, explain health economics and consequences for pharmacies. Explain the basic economic evaluation and interpret results (International society of pharmacoeconomics & outcome research, 2005; Ovid, 2005). Evaluate quality of life and a patient's willingness to pay (International society of pharmacoeconomics & outcome research, 2005; Marchetti et al., 1998:852; Ovid, 2005).

The approaches are referred to as the human capital and the willingness to pay. The human capital approach measures the value of health state in terms of how it affects a person's ability to work (Ellis *et al.*, 2002:280). The value that a patient attaches to receiving follow-ups or interest shown in a patient's recovery can estimate the willingness to pay (Tomkins *et al.*, 2004:84). In the willingness-to-pay method, a dollar value is placed on treatment outcomes. The disadvantage of this method is that it can result in higher values for certain population groups (Ellis *et al.*, 2002:280).

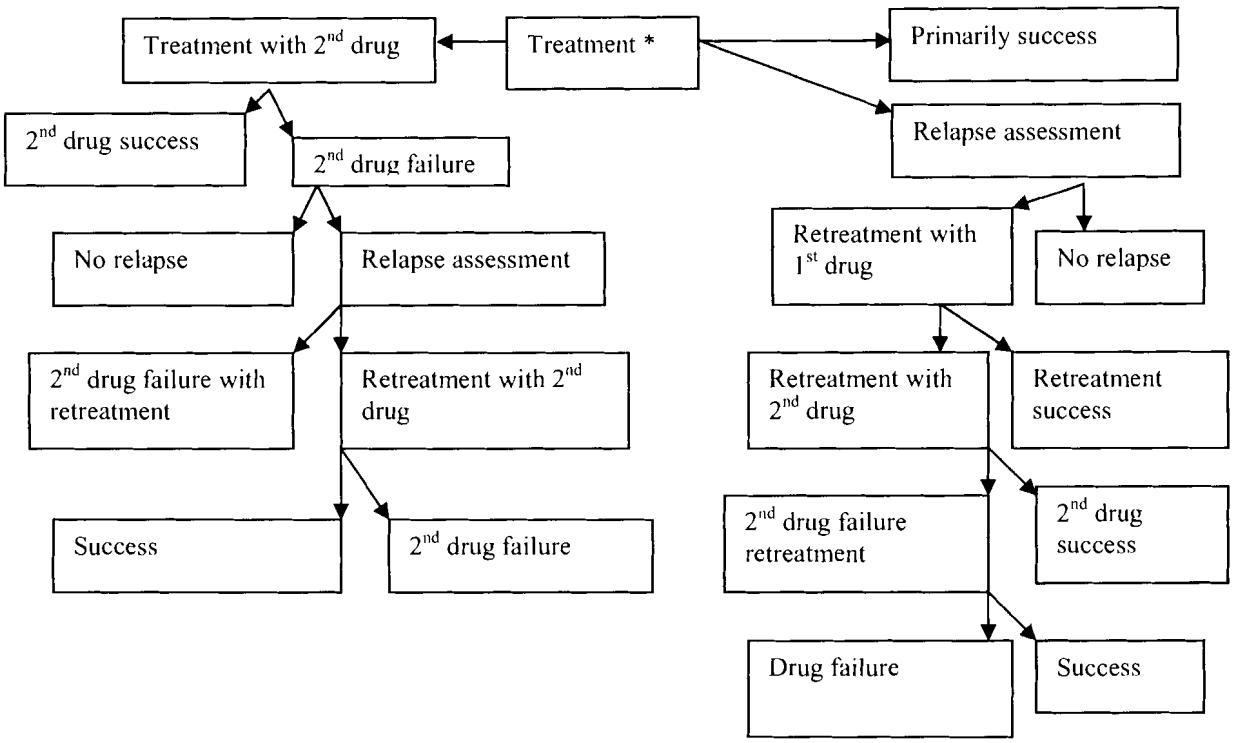
3.8.6. DIFFERENT TYPES OF COST AND CALCULATING OF COST

The rising costs of health care have stretched national health budgets around the world, often leading to limitation of services (Walley, 1999:S3).

In cost measurement it must be decided what to include in the calculation of costs. Cost comprises direct medical, direct non-medical and indirect costs (Ellis *et al.*, 2002:279). There are considerable costs associated with dermatological treatments. Many of the patients could

give information on the cost of medicine. Is a patient willing to pay for complete remission but not more than the average cost of treatment (Schäfer *et al.*, 2001:697)?

Health economics models link medical treatment patterns to clinical outcomes and cost (Marchettti *et al.*, 1998:853).



* This is the starting point

Figure 3.6: Decision analysis model for treatment of patients (**adapted** from Marchetti *et al.*, 1998:854).

The model in figure 3.6. can be used to calculate two decision variables: total expected cost and cost-effectiveness. The expected cost concerns only the budgetary impact of therapy, whereas cost-effectiveness indicates the trade-off between budgetary impact and clinical outcomes (Marchetti *et al.*, 1998:862).

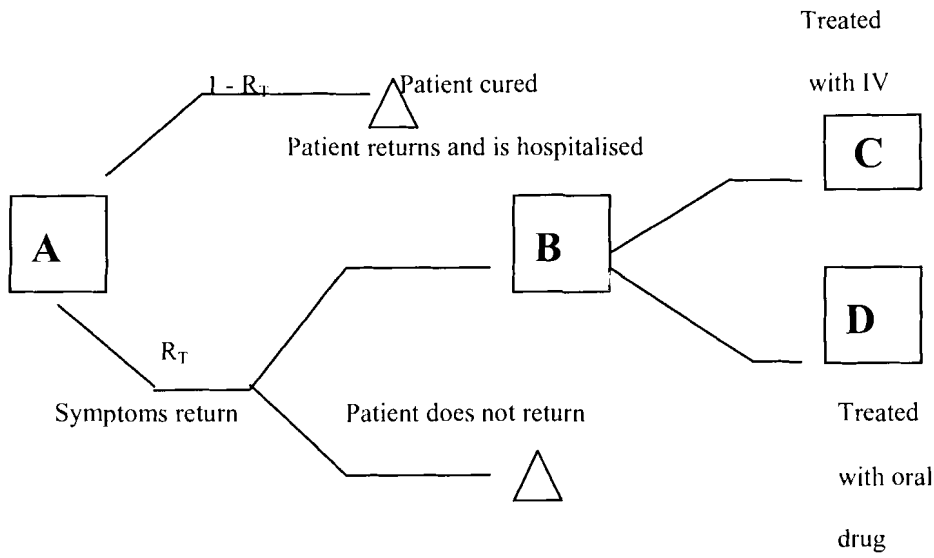


Figure 3.7: Decision tree illustrating the costing methodology used in economic comparison (**adapted** from Wilkins *et al.*, 2002:86).

Cost is the total value of all resources that are consumed in the production of a product or service that was given (Larson, 1996:45; Struwig, 2001:58).

Direct cost represents expenditures for prevention, detection, treatment, rehabilitation, research, training and capital investment in medical facilities (Bootman *et al.*, 1991:8).

Indirect cost is related to morbidity cost from lost work days and mortality cost, which refers to the income foregone by an individual due to death (Bootman *et al.*, 1991:8). For example the loss of productivity and cost of travel to hospital (Walley, 1999:S5).

According to Dehkharghani *et al.* (2003:594) medication cost can be calculated as follows:

Medication costs = $N_v M_v C_m (1 + r_R)$ **Equation 3**

N_v - is the number of visits

M_v-is the number of medications per visit

C_m-Is the cost per medication

r_R- is the estimated rate of refills (Dekharghani *et al.*, 2003:594).

3.8.7. BARRIERS TO CONDUCTING A PHARMACO-ECONOMIC RESEARCH STUDY

The barriers of pharmaco-economics data are the manifestation of three main issues:

- Difficulty in managing coexisting dynamic states of evolving pharmaco-economic methods
- The fragmentation of health care budgets
- The diversifying of health care systems and settings throughout the world
- The lack of decision-maker experience in integrating pharmaco-economic and clinical data in reimbursement decisions can also prove to be a problem.
- Decision maker mistrust and fear of bias in manufacturer-sponsored pharmaco-economic studies as well as difficulty in moving resources from one budget to another at times cause problems. In applicability of studies to individual payer or country populations and practice patterns difficulties can be experienced.
- The differences in clinical trials and real-life-environments must also be taken into account (Bentkover & Correy, 2002:78).

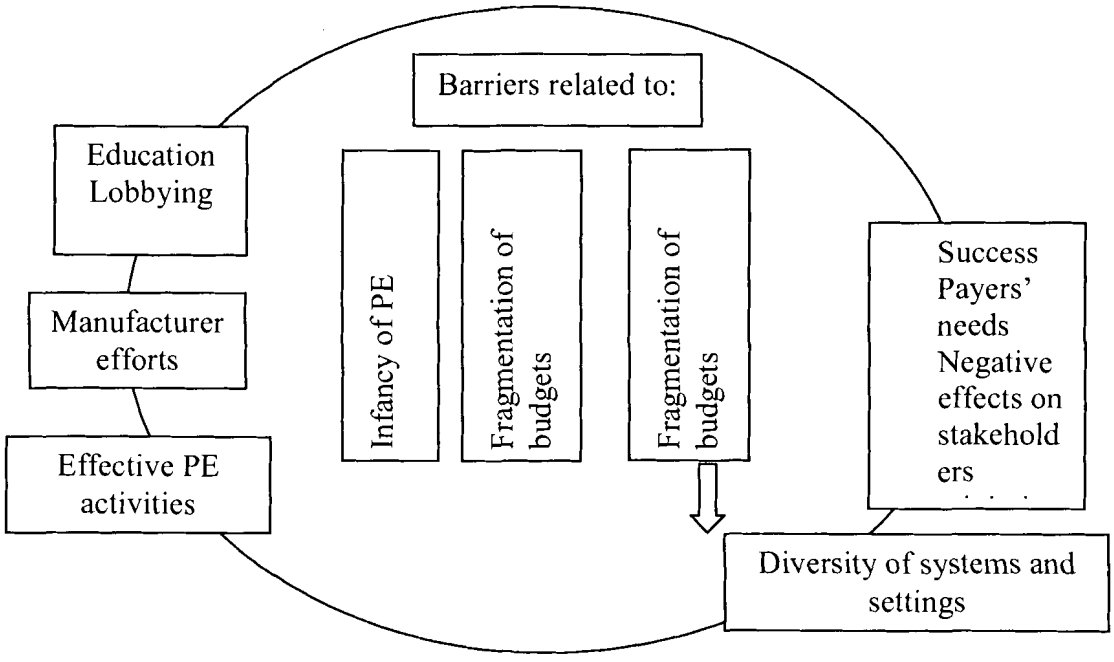


Figure 3.8: Overcoming the barriers in pharmaco-economics (Bentkover & Correy, 2002:80).

3.9. CHAPTER SUMMARY

In this chapter the health care concepts were described. The different definitions as well as the methods to apply were being looked at. The next chapter contains the method of the empirical study.

CHAPTER 4
RESEARCH METHODS

4.1. INTRODUCTION

In this chapter both the general and specific research objectives of the research project as well as the research methodology of the empirical investigation will be described.

The data were obtained from a medical claims database by means of retrospective and non-experimental research. The study focused on only the dermatological products with a frequency of more than 10 % on the database (SAS institute Inc, 2004).

4.2. RESEARCH OBJECTIVES

The general as well as the specific objectives of this study will be outlined below.

4.2.1. GENERAL OBJECTIVES OF THE EMPIRICAL STUDY

The general objective of this study was to investigate the usage patterns and costs of dermatological products in the private health care sector of South Africa according to a medicine claims database, with special reference to those products with a prevalence of more than 10 % on the database. The data on the medicine claims database for the two study years 2001 and 2004 were divided into three four-monthly intervals for each of the years.

4.2.2. SPECIFIC OBJECTIVES

The specific research objectives included the following:

Literature objectives

The specific research objectives of the literature study were as follows:

- To present a brief overview of the anatomy of the skin.
- To describe nail abnormalities and pruritus as dermatological problems.

- To describe from the literature the different dermatological diseases that account for more than 10% of all dermatological products on the medicine claims database, while at the same time referring to their treatments.
- To briefly look at the relationships between the different health care concepts.
- To define the essence of managed health care.
- To present a brief description of disease management, case management, outcome management and component management.
- To investigate what the South African prospective of managed health care is.
- To state briefly what pharmaceutical care entails.
- To mention briefly to what the concept of drug utilisation review refers.
- To describe what evidence based medicine is.
- To describe pharmaco-epidemiology.
- To discuss the essence of pharmaco-economics.

Empirical objectives

The specific research objectives of the empirical study were the following:

- To determine the usage patterns and costs of the dermatological products in the private health care sector of South Africa.
- To determine the cost of the dermatological products according to the new single exit price structure that came into effect on the 2nd of May 2004 and what cost savings there had been.
- To determine the prevalence and costs associated with innovator and generic equivalents of dermatological products mentioned in this study.
- To investigate the prevalence and costs of combination therapy in dermatology.
- To formulate recommendations with regard to the medicine management of dermatological diseases.

4.3. REASEARCH METHODOLOGY

The study consisted of two phases namely the literature study and the empirical study.

4.3.1. LITERATURE STUDY

4.3.1.1. Phase one: Literature review

A literature study was also done with regard to relevant literature from journals, textbooks and other sources, like the Internet.

The research study was divided into two phases, *i.e.* the literature phase and the research phase.

The review has been divided into two chapters. The first chapter deals with the different dermatological diseases that are relevant to this study. These diseases are discussed under the following headings: etiology, clinical presentation and treatment of the condition.

The second chapter consists of the managed health care concepts relevant to this study and include pharmaceutical care and disease management concepts. The disease management is further described under the following headings: pharmaco-economics, retrospective drug utilisation review, pharmaco-epidemiology and evidence based medicine as well as the relevant principles.

4.3.2. EMPERICAL STUDY

4.3.2.1. Phase two: Empirical investigation

A retrospective drug utilisation study was done on dermatological products of a medicine claims database for the years 2001 and 2004. The data obtained from the medicine claims database were divided into three four-month intervals (January to April, May to August and September to December). The statistical analysis of the data was done with the SAS 9.1.® Computer package (SAS institute Inc, 2004). The year 2001 was chosen because it was regarded as a stable time in the cost of medicine products. The 2004 study periods were selected because the new single exit price was implemented on the 2nd of May 2004. This had an effect on the costs of medicines. The empirical investigation consisted of the following steps:

- Research design – which is the backbone of the study and outlines what has been selected to be studied. The focus of this study was the dermatological products with a prevalence of more than 10 % as described in chapter 5.
- Selection of research instrument(s) – the research instruments included the medicine items that had been used, the medicine usage patterns and medicine costs. An overview

of the dermatological products' prevalence, usage patterns and the costs of these products is provided (See paragraph 4.3.2.3.).

- Analysis of data – this section was completed with the assistance of statistical methods. The statistical concepts were utilised to analyse the data according to the measuring instruments.
- Reliability and validity – the information was extracted directly from the medicine claims database and was believed to be correct and precise.
- Discussion based on findings in the empirical study – this is done in chapter 5.
- Conclusion and recommendations based on the results of the empirical investigation – these are outlined in chapter 6.

4.3.2.2. DATA COLLECTION

The data used in this study were extracted from the medical claims database, with the permission of the owners of the medical claims database, for the years 2001 and 2004, and the data obtained were divided into three four-month intervals for each of the years. The reasons for selecting the years 2001 and 2004 were that the cost of medicine was considered to be stable during 2001 and in 2004 the cost of medicine was influenced by the new pricing regulation that was implemented on the 2nd of May 2004.

4.3.2.3. ANALYSIS OF DATA

The statistical analysis system, SAS (SAS institute Inc, 2004) was used to analyse the data. The analysis consisted of two parts. The first part of the analysis was on all products. The second part of the analysis was specifically on the dermatological products on the database.

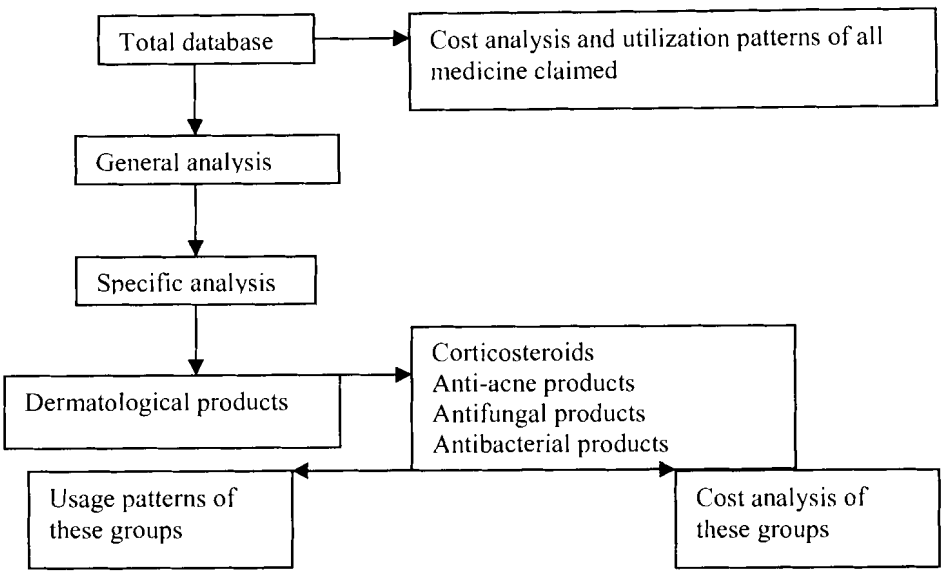


Figure 4.1. The pathway of the analysis that was followed to extract the data.

4.3.2.4. REASEARCH INSTRUMENTS

The research instruments are discussed under the following headings:

4.3.2.4.1. MEDICINE ITEMS

Medicine items can be defined as the substance intended for use in the diagnosis, cure, migration, treatment, modification or prevention of disease, abnormal physical or mental state or the symptoms thereof in man (Medicine and Related Substances Control Act, Act 101 of 1965). In this study the term medicine items is used as synonym for drug.

In this study the idea is to get an overall view of dermatological drugs used.

4.3.2.4.2. MEDICINE USAGE PATTERNS

A usage pattern is defined as the probability that a condition or the occurrence of a condition exists in a specified population (Waning & Montagne, 2001:21). Medicine usage patterns must be considered as an important factor during analyses of a medicine usage data because they give an idea of the number of drugs being prescribed and the percentage of people within the population that suffer from the diseases for which the medicine items are usually prescribed.

The following data on the medicine claims database have been analysed:

- The prevalence of the medicines claimed during the study period

- The prevalence according to generic and innovator products
- The prevalence of the drugs chosen for this study, e.g. dermatological products

4.3.2.4.3. MEDICINE COST

The medicine cost is defined as the monetary value of resources consumed in the production or delivery of medicine (Larson, 1996:46).

The total medicine cost, the average medicine cost per prescription, the average medicine cost per item as well as the cost-prevalence index were analysed:

- The total cost of all medicine items claimed during the two study years were compared for 2001 and 2004.
- The total costs of all medicine items claimed according to generic or innovator products for the two years were compared.
- The cost difference between innovator and generic products was investigated.
- The cost of individual dermatological products was investigated.

4.3.2.5. STATISTICAL ANALYSIS

The following descriptive statistical concepts were utilised to analyse the data according to the measuring instruments / criteria as discussed in the research instruments paragraph.

4.3.2.5.1. AVERAGE VALUE

The mean value is the best known single numerical value used to indicate the central position / location of the numbers (Steyn *et al.*, 1994:90). In terms of statistical presentation, the mean value may be defined algebraically as

$$\bar{x} = \sum \frac{x}{n} \qquad \textbf{Equation 4}$$

$\bar{x}$ = the mean

Σ = the sum of

n = the number of observation

x = any value in the data set (Steyn *et al.*, 1994:90).

4.3.2.5.2. STANDARD DEVIATION

The variation is a measure of how spread out (a variable's spread is the degree to which the variables differ from each other) a distribution is. It is calculated as the average square deviation of each number from its mean (Steyn *et al.*, 1994:1320). The standard deviation is the positive square root of the variance (Huysamen, 1998:56). It measures variability to the original units of measurement (Mendenhall *et al.*, 1993:51).

Statistically the standard deviation may be obtained as follows:

$$S = \frac{\sqrt{\Sigma(\bar{x} - x)^2}}{N - 1}$$ **Equation 5**

S= the standard deviation

N = the number of observation

Σ = the sum of

$\bar{x}$ = the mean

x = any value in the data set (Steyn *et al.*, 2994:129).

4.3.2.5.3. WEIGHTED AVERAGE

The weighted average was used in the appendix to calculate the average cost of the other pharmacological groups. The weighted mean is used in the computation of the joint mean of various sets of data. It is primarily used to calculate the average value from the different average values (Steyn *et al.*, 1994:102).

$$\bar{x}_w = \frac{\sum n_i \bar{x}_i}{\sum n_i}$$ **Equation 6**

$\bar{x}_w$ = the joint arithmetic mean

$\bar{x}_i$ = the arithmetic mean of data set

n_i = the size of the data set

i=1,2,.....,k, (the data set) (Steyn *et al.*, 1994:104).

4.3.2.5.4. EFFECT SIZES

$$\mathbf{d} = \frac{\tilde{x}_a - \tilde{x}_b}{S_{max}} \qquad \textbf{Equation 9}$$

$\tilde{x}_a$ = the average value of population a

$\tilde{x}_b$ = the average value of population b

S_{max} =the maximum standard deviation between a and b (Steyn *et al.*, 1994:104).

The d-value will be used in this study to see whether differences of practical significance exist between the average medicine costs (Steyn *et al.*, 1994:104).

This is the degree to which a phenomenon is present in a population (Cohen, 1988:9). The d-value can be classified as,

/d/≤< 0.2 (Small effect with no practical significant difference)

/d/~ 0.5 (medium effect size with an effect that is perceived to be probably significant)

/d/≥> 0.8 (large effect that is significant and of practical importance).

4.3.2.5.5. COST-PREVALENCE INDEX

The cost-prevalence index can be defined as (Serfontein, 1989:180):

$$\text{Cost-prevalence index} = \frac{Cost\%}{\text{Pr}evalence\%} \qquad \textbf{Equation 10}$$

For the purpose of this study, the cost-prevalence values were interpreted as follows (Serfontein, 1989:180):

- Cost index < 1: Consumed treatment is relatively inexpensive.
- Cost index = 1: The cost of treatment is symmetric to the prevalence.
- Cost index > 1: Consumed treatment is relatively expensive.

4.3.3. RELIABILITY AND VALIDATION OF THE RESEARCH INSTRUMENTS

The study was conducted using information extracted directly from the medical claims database. The research was conducted under the impression that all the data attained from the database were precise and correct. The data obtained and analysed from the data source can only be generalised to the database and the specific study population.

4.3.4. DISCUSSION OF THE RESULTS OF THE EMPIRICAL INVESTIGATION

The discussion and the results of the empirical study will be laid out profoundly in Chapter 5.

4.3.5. CONCLUSION AND RECOMMENDATIONS

The conclusion, suggestions, limitations will be fully outlined in Chapter 6. In chapter 6 the literature and empirical investigation relationship will be presented.

4.4. CHAPTER SUMMARY

In this chapter the research methodology was explained. The discussion included both the general and the specific research objectives of the literature and the empirical investigation, data source and the research methodology. The next chapter contains the results and the discussion of the data.

CHAPTER 5
RESULTS AND DISCUSSION

5.1. INTRODUCTION

In this chapter the results of the empirical investigation of the usage patterns and cost of the medicine used for dermatological reasons are discussed. The results pertain to the two study years (1 January to 31 December 2001 and 1 January to 31 December 2004). The results were analysed in separate four-monthly intervals from the database (Refer to paragraph 5.3).

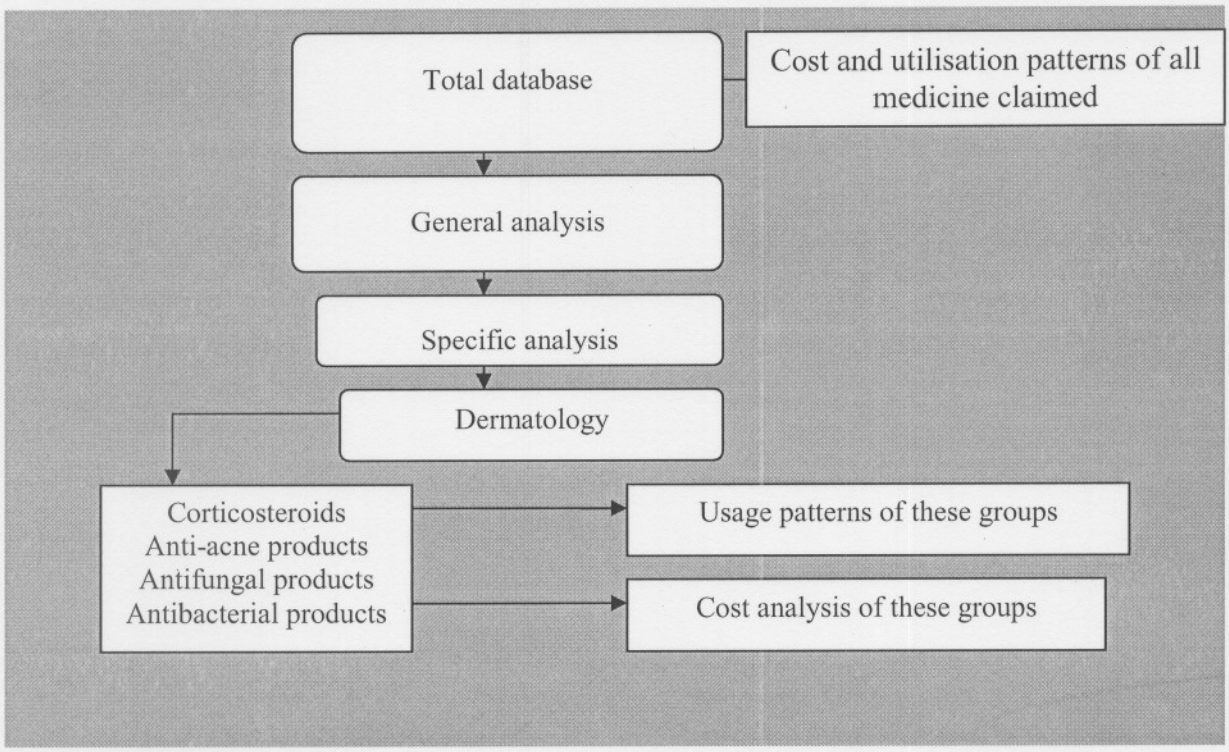


Figure 5.1: Research analysis and research objectives of the study.

5.2. A GENERAL REVIEW OF THE MEDICINE AVAILABLE

The prescribing patterns and cost of dermatological medicine products were analysed according to the following diagram:

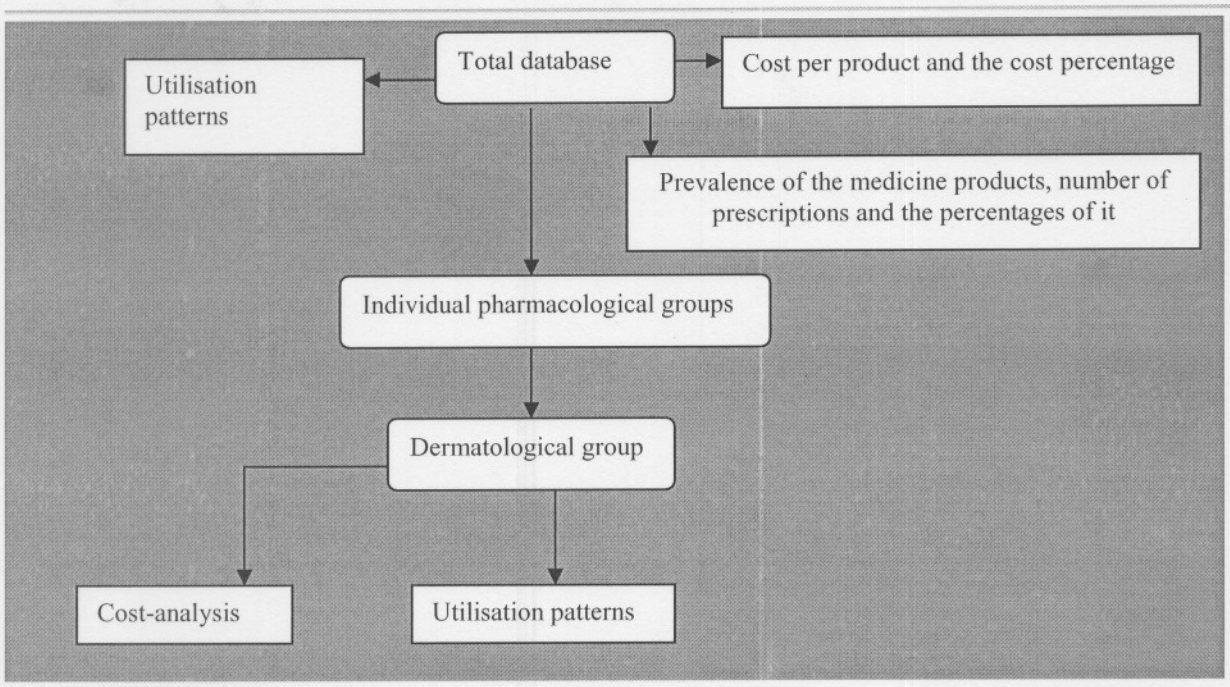


Figure 5.2: General review of the research objectives approached in this study.

5.3. IMPORTANT CLARIFICATIONS WITH REGARD TO THE INTERPRETATION OF THE RESULTS

- The medicine products that are listed in this study are the medicine products that were claimed on the medicine claims database and these medicine products are available on the South African market.
- The study was based on information received from the medical claims database. For the purpose of this study three, four-monthly intervals were compared in 2001 and 2004. The intervals were as follows:
  - January 2001 to April 2001
  - May 2001 to August 2001
  - September 2001 to December 2001
  - January 2004 to April 2004
  - May 2004 to August 2004
  - September 2004 to December 2004
- For this study the focus will be on the dermatological medicines and specifically the corticosteroids, anti-acne, antifungal and antibacterial medicines as these four

pharmacological groups had a prevalence of more than 10 % on the medicine claims database (Refer to tables 5.9 and 5.10).

- For the purpose of this study the other dermatological groups were categorised in the group "Others".
- The percentages have been rounded off to the nearest 100.
- The abbreviations used in this study:

I	Innovator or original medicine
G	Generic medicine
Rx	Prescription
SD	Standard deviation
SEP	Single exit price*

* The single exit price was implemented on 2 May 2004. This means that discounting was unlawful from this date onwards. The following are the dispensing fee rules for the amount that may be added to the single exit price of the product: Dispensing fee of 26 % if the price of the product is less that R100 and if the product is more than R100, the profit margin may not exceed R26 (no more than R26 added to the single exit price) (Tshabala-Msimang, 2004).

- The d-values of the different products' prevalence and costs were noted and only if the values were greater than 0,8 they were considered as being of practical significance (Refer to chapter 4 paragraph 4.3.3.4.4.).
- For the purpose of this study, the cost-prevalence values were interpreted as follows (Serfontein, 1989:180):
  - Cost index < 1: Consumed treatment is relatively inexpensive.
  - Cost index = 1: The cost of treatment is symmetric to the prevalence.
  - Cost index > 1: Consumed treatment is relatively expensive.

5.4. GENERAL ANALYSIS

The cost analysis as well as the utilisation patterns will be discussed under the following headings:

5.4.1. UTILISATION PATTERNS

The total number of prescriptions claimed during the study period increased by 75.90 % from 2001 (N = 1 475 380) to 2004 (N = 2 595 254). In comparison with the number of prescriptions claimed for this period the total number of medicine products claimed increased with 79.78 % from 2001 (N = 2 951 326) to 2004 (N = 5 305 882). Although there was an increase in the total number of prescriptions and products the average number of products per prescription was constant and there was no practical significant increase in the number of products per prescription (Refer to tables 5.2 & 5.3).

The increase in both the number of prescriptions and the number of medicine products claimed during this study period may be due to the increase in the number of medical schemes that claimed through the Interpharm® Datasystem or an increase in the number of medical aid members and their dependants.

The dermatological products accounted for 4.77 % (n = 140 701) of the total number of products claimed (N = 2 951 326) during 2001 while the claims made during 2004 (N = 5 305 882) showed a 1 % decrease to 3.77 % (n = 199 976). In comparison with the previously mentioned statistics the dermatological products made up 4.98 % (n = R 18 913 889.92) of the total cost of all medicine products in 2001 (N = R 379 708 489) while it showed a decrease of 0.9 % to 4.08 % (n = R 27 025 540.48) during 2004 (N = R 661 223 146). The dermatological prescription percentages for the study period were 8.57 % (n = 126 447) and 6.82 % (n = 177 112) of the total number of prescriptions claimed respectively for 2001 (N = 1 475 380) and 2004 (N = 2 595 254).

The following table contains the total values of the different time periods that were used to calculate prevalence and cost percentages. The total value was the value, which was used to calculate the percentages of the prevalence and the cost.

Table 5.1: The total value of the medicine products that were utilised during each study period of 2001 and 2004.

Time period	Total number of dermatological products	Total cost of the dermatological products (R)	Total number of all medicine products	Total cost of all medicine products (R)	Total number dermatological prescriptions	Total number of all prescriptions
January to April 2001	51 273	6 665 728.40	966 161	125 667 469	46 114	481 029
May to August 2001	46 461	6 375 332.90	1 125 367	138 897 443	41 708	548 598
September to December 2001	42 967	5 872 828.62	859 798	115 143 577	38 625	445 753
January to April 2004	51 826	7 963 259.14	1 363 585	198 934 122	46 340	713 475
May to August 2004	67 689	9 631 055.06	1 953 845	242 721 616	59 606	935 644
September to December 2004	80 461	9 431 226.28	1 988 452	219 567 408	71 166	946 135
Total for 2001	140 701	1 8913 889.92	2 951 326	379 708 489	126 447	1 475 380
Total for 2004	199 976	27 025 540.48	5 305 882	661 223 146	177 112	2 595 254

After comparing the different intervals of the individual dermatological data with the total database the following conclusions were made:

The results revealed that the percentage of products represented by dermatological products increased with 1.08 % from the first four-monthly period of 2001 (January 2001 to April 2001) to the first four-month period of 2004 (January 2004 to April 2004). The intervals May 2004 to August 2004 and September 2004 to December 2004 showed an increase of 45.69 % and 87.26 % respectively. The dermatological products represented 4.13 % (n = 340 677) of the total number of medicine items (N = 8 257 208) claimed during the study period (Refer to table 5.1).

The total costs of dermatological medicine products were compared to the total cost of all medicine products claimed during 2001 (N = R 379 708 489) and 2004 (N = R 661 223 146). The three four-monthly intervals for 2001, January to April; May to August and September to

December, showed that the dermatological medicine products were 1.76 %; 1.68 % and 1.55 % of the total cost of medicine respectively while the three four-monthly intervals for 2004 also known as January to April; May to August and September to December showed a decrease of 1.20 %; 1.46 % and 1.43 % respectively (Refer to Table 5.1). The decrease in the total cost of dermatological products can be due to the decrease in the price of medicine products because of the single exit price regulation that was implemented on 2 May 2004.

The following comparisons can be made from the number of prescriptions for all products: January 2001 to April 2001 (N = 481 029) was 9.59 % (n = 46 114) and 6.49 % (n = 46 340) in January to April 2004 (N = 713 475). May 2001 to August 2001 and September 2001 to December 2001 compared to May 2004 to August 2004 and September 2004 to December 2004 increased by 42.91 % and 84.25 % respectively (Refer to table 5.1).

The average number of products per prescription remained more or less constant over the six study periods (2001 and 2004) used in this study which means, with reference to tables 5.2 and 5.3, an average of two products were claimed per prescription while the average cost per product decreased in 2004 especially in September 2001 to December 2004 due to the implementation and enforcement of the pricing regulations. During January 2004 to April 2004 and September 2004 to December 2004 there was a decrease of 24.31 % in the average cost of medicine products claimed: From R145.89±283.72 to R110.42±202.84. The d-value (Refer to table A4) of the average cost per product was very small and of no practical significance between the four-monthly intervals of January 2004 to April 2004 and September 2004 to December 2004. (Refer to paragraph 5.3 and chapter 4 paragraphs 4.3.2.5.6.).

Table 5.2: Summary of the utilisation patterns of all medicine products claimed during 2001.

Explanation	Jan to April 2001		May to Aug 2001		Sept to Dec 2001	
Total number of medicine products (N = 2 951 326)	966 161	32.74 %	1 125 367	38.13 %	859 798	29.13 %
Total number of prescriptions (N = 1 475 380)	481 029	32.60 %	548 598	37.18 %	445 753	30.21 %
Average number of products / Rx*	2.01 ± 1.18		2.05 ± 1.20		1.93 ± 1.13	
Total cost of the medicine products in %	33.10 %		36.58 %		30.32 %	
Total cost of Medicine products (R)	125 667 469		138 897 443		115 143 577	
Average cost / Medicine products(R)	130.07 ± 149.27		123.42 ± 141.96		133.92 ± 166.71	
Average cost / Rx* (R)	261.25 ± 271.95		253.19 ± 256.82		258.31 ± 286.64	

*Prescriptions

**The percentages were calculated according to the number of products for each period divided by the total number of medicine products for the year. For example 966161 (January to April 2001) / 2951326 (2001) x 100 = 32.74%. The percentage of the number of prescriptions was also calculated in the same manner except that the prescription totals were used.

Table 5.3: Summary of the utilisation patterns of all medicine products claimed during 2004.

Explanation	Jan to April 2004		May to Aug 2004		Sept to Dec 2004	
Total number of medicine products (N = 5 305 882)	1 363 585	25.7 %	1 953 845	36.82 %	1 988 452	37.48 %
Total number of prescriptions (N = 2 595 254	713 475	27.49 %	935 644	36.05 %	946 135	36.46 %
Average number of products / Rx*	1.91 ± 1.21		2.09 ± 1.29		2.1 ± 1.30	
Total cost of the medicine products in %	30.09 %		36.71 %		33.21 %	
Total cost of Medicine products (R)	198 934 122		242 721 616		219 567 408	
Average cost / Medicine products(R)	145.89 ± 283.72		124.23 ± 208.03		110.42 ± 202.84	
Average cost / Rx* (R)	278.82 ± 476.38		259.42 ± 370.98		232.07 ± 354.89	

*Prescriptions

**The percentages were calculated according to the number of products for each period divided by the total number of medicine products for the year. For example 1 363 585 (January to April 2004) / 5 305 882 (2004) x 100 = 25.70%. The percentage of the number of prescriptions was also calculated in the same manner except that the prescription totals were used.

5.4.2. THE UTILISATION PATTERNS OF INNOVATOR AND GENERIC PRODUCTS

The total number of innovator products used increased by 63.27 % from 2001 (N = 2 161 451) to 2004 (N = 3 529 046), although the prevalence percentage (Refer to table 5.4) showed a decrease in the innovators. The total number of generic products used increased by 124.95 % from 2001

(N = 789 875) to 2004 (N = 1 776 836). There was a decrease in the average cost per product between January 2004 to April 2004 versus September 2004 to December 2004 of 26.14 % and 54.71 % respectively for the innovator and generic products. There was a decrease in the average cost per product during September 2004 to December 2004 for both the innovator (R141.14±240.77) and generic products (R51.93±62.41), compared to January to April 2004 in which case the cost of the innovator products was R178.03±336.25 and the generic products R80.34±87.58 (Refer to table 5.4). The d-value calculated between the average costs of the innovator products was of no practical significance (Refer to table C1).

There was an increase of 124.95 % in the total number of generic products, but the total cost of generics increased by 53.57 % from 2001 (N = 53 112 998.21) to 2004 (N = 111 564 370.40). Even though the cost increased it was not due to a price increase but rather due to generic products that were used more often. A deduction could be made that though the average cost of the generic medicines decreased over the last study year (2004) there was a definite increase in usage of the generic products. The total cost of innovator products increased by 40.58 % from 2001(N = R 326 595 490.60) to 2004 (N = R 549 658 776). The cost-prevalence index for the innovator products was greater than one (Refer to paragraph 4.3.2.5.5.). Therefore it was relatively expensive to use innovator products. The generics were less expensive during the study periods (Refer to table 5.4 and 5.5).

Table 5.4: Utilisation of all generic or innovator medicine products during 2001 and 2004.

Month intervals		Prevalence		Average cost / medicine product	Total cost
	I or G	N	% ***	(R)	(R)
January to April 2001	I*	715 901	74.10	152.65 ± 163.44	109 280 566
	G**	250 260	25.90	65.48 ± 63.06	16 386 903.21
May to August 2001	I	823 718	73.20	144.48 ± 156.41	119 008 811
	G	301 649	26.80	65.93 ± 62.14	19 888 631.61
September to December 2001	I	621 832	72.32	158.09 ± 186.13	98 306 113.58
	G	237 966	27.68	70.76 ± 66.15	16 837 463.39
January to April 2004	I	915 004	67.10	178.03 ± 336.25	162 893 692
	G	448 581	32.90	80.34 ± 87.58	36 040 430.05
May to August 2004	I	1 310 328	67.06	154.74 ± 243.02	202 759 367
	G	643 517	32.94	62.1 ± 73.43	39 962 249.18
September to December 2004	I	1 303 714	65.56	141.14 ± 240.77	184 005 717
	G	684 738	34.44	51.93 ± 62.41	35 561 691.21

*Innovator medicine products

**Generic medicine products

***The prevalence percentage was calculated from the number of innovator medicine products (or generic medicine products) divided by the total number of medicine products for that time period multiplied by a hundred.

Table 5.5: The cost-prevalence index of all the medicine products during the study periods of 2001 and 2004.

Month periods	I or G	Cost percentage (%)*	Prevalence percentage (N %)	Cost-prevalence index
January to April 2001	I	86.96	74.10	1.17
	G	13.04	25.90	0.50
May to August 2001	I	85.68	73.20	1.17
	G	14.32	26.80	0.53
September to December 2001	I	85.38	72.32	1.18
	G	14.62	27.68	0.53
January to April 2004	I	81.88	67.10	1.22
	G	18.12	32.90	0.55
May to August 2004	I	83.54	67.06	1.25
	G	16.46	32.94	0.50
September to December 2004	I	83.80	65.56	1.28
	G	16.20	34.44	0.47
Totals for 2001	I	86.01	73.24	1.17
	G	13.99	26.76	0.52
Totals for 2004	I	83.13	66.51	1.25
	G	16.87	33.49	0.50

The information in this table was calculated from table 5.4. where the total values for each interval as well as each innovator and generic total were represented.

*The cost percentage was calculated from the total cost of innovators for the period divided by the total cost of all medicine products for that period. The same method was followed for the generic products and for every period in the study.

5.4.3. PREVALENCE AND COST OF THE DIFFERENT PHARMACOLOCICAL GROUPS

The prevalence percentage was calculated for the prevalence of the different pharmacological groups. The prevalence has been calculated according to the total number of medicine products claimed during each four-month period. The four most frequent pharmacological groups claimed on the database were chosen as well as the dermatological group for this section. The four most frequent groups chosen had a prevalence of more or less 10 % while the dermatological group varied between 3.46 % and 5.31 % (refer to table 5.6).

Table 5.6: Prevalence of the different pharmacological groups claimed for 2001 and 2004.

Month		Antimicrobials	Respiratory	Central Nervous system	Analgesics	Dermatological products
	N *	136 652	116 185	108 735	104 086	51 273
Jan to Apr 2001	% **	14.14	12.03	11.25	10.77	5.31
	N*	168 891	201 839	108 753	123 192	46 461
May to Aug 2001	%**	15.01	17.94	9.66	10.95	4.13
	N*	112 038	108 544	89 401	88 132	42 967
Sept to Dec 2001	%**	13.03	12.62	10.4	10.25	5
	N*	14 903	142 835	128 169	112 820	51 826
Jan to Apr 2004	%**	10.93	10.47	9.4	8.27	3.8
	N*	268 850	286 615	156 546	178 563	67 689
May to Aug 2004	%**	13.76	14.67	8.01	9.14	3.46
	N*	264 574	199 304	172 285	173 459	80 461
Sept to Dec 2004	%**	13.31	10.02	8.66	8.72	4.05

*N is the prevalence of the different main pharmacological groups
**The percentage is for the prevalence of the different pharmacological groups given as a percentage. It was calculated as a percentage of the total number of medicine items claimed during each period.

In tables A6 and A7 (Appendix A) the average cost of the medicine items, including dermatological products of the top ten pharmacological groups is given. During the study period the average cost per dermatological product increased from January to April 2001, to January to April 2004 by 18.19 %. To compare January to April 2004 versus September to December 2004 where the new pricing regulations came into effect the dermatological product average cost decreased by 23.72 %, but the total cost increased with 18.43 %.

5.5. ANALYSIS OF DERMATOLOGICAL PRODUCTS

The prevalence and cost of dermatological products prescribed will be addressed in this section:

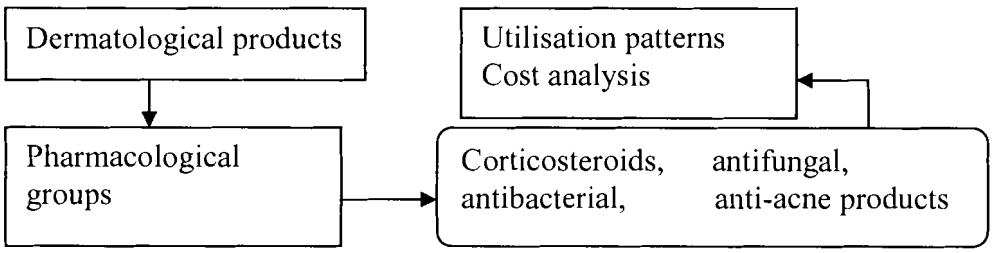


Figure 5.3: The individual dermatological groups linked to the purpose of specific analysis.

5.5.1. THE UTILISATION PATTERNS OF THE DERMATOLOGICAL PRODUCTS

In the summary of the utilisation patterns it was observed that the total number of products increased over the time interval January to April 2004 to September to December 2004, from

25.92 % to 40.24 %. Of the total number of prescriptions (N = 4 070 634) issued during the different study periods, 7.46 % (n = 303 559) of the prescriptions contained dermatological products. The number of prescriptions for dermatological products increased from January 2004 to April 2004 (N = 46 340) versus September 2004 to December 2004 (N = 71 166) by 53.57 %.

From 2001 (January to April 2001) to 2004 (January to April 2004), there was a decrease in the number of dermatological products from 36.44 % (2001) to 25.92 % (2004) respectively. The increase of 55.25 % from January 2004 to April 2004 (N = 51 826) to September 2004 to December 2004 (N = 80 461) could possibly be contributed to an increase in the intensity of skin diseases or may be due to an increase in the number of patients with access to medical aids plans (Refer to table 5.7 and 5.8.).

The total cost of the dermatological products amounted to R45 939 430.40 for both study years. This represented 4.41 % of the total cost of all products (N = R 1 040 931 635) during both study years. The total cost of dermatological products amounted to 4.98 % (n = R 18 913 889.92) during 2001 (N = R 379 708 489) of all products claimed. The total cost of dermatological products amounted to R 27 025 540.48 representing 4.09 % of the total cost of all products claimed during 2004 (N = 661 223 146) (Refer to tables 5.1; 5.7 and 5.8).

Table 5.7: Summary of the utilisation patterns of the dermatological products in 2001.

EXPLANATION	January to April 2001		May to August 2001		September to December 2001	
Total number of products	51 273	36.44%**	46 461	32.02 %**	42 967	30.54 %**
Average number of products / Rx*	1.11 ± +0.35		1.11 ± 0.36		1.11 ± 0.35	
Minimum number / Rx*	1		1		1	
Maximum number / Rx*	6		6		6	
Number of prescriptions	46 114	36.47 %	41 708	32.98 %	38 625	30.55 %
Average cost / Rx* (R)	144.55 ± 161.35		152.86 ± 183.02		152.05 ± 187.61	
Total cost / Rx* (R)	6 665 728.4		6 375 332.9		5 872 828.62	
Average cost / products (R)	130 ± 138.39		137.22 ± 158.88		136.68 ± 160.92	

*Rx represents prescriptions

**The percentage of the total number of products was calculated as a percentage for the whole year. Eg. 51273 divided by 140701. This value is then multiplied by 100 to get a percentage.

Table 5.8: Summary of the utilisation patterns of the dermatological products in 2004.

EXPLANATION	January to April 2004		May to August 2004		September to December 2004	
Total number of products	51 826	25.92 % **	67 689	33.85 % **	80 461	40.24 % **
Average number of products / Rx*	1.12 ± 0.37		1.14 ± 0.40		1.13 ± 0.4	
Minimum number / Rx*	1		1		1	
Maximum number / Rx*	6		6		6	
Number of prescriptions*	46340	26.16 %	59606	33.65 %	71166	40.18 %
Average cost / Rx* (R)	171.84 ± 201.35		161.58 ± 198.36		132.52 ± 135.07	
Total cost / Rx *(R)	7 963 259.14		9 6931 055.06		9 431 226.28	
Average cost / products (R)	135.65 ± 173.74		142.28 ± 168.06		117.21 ± 113.87	

*Rx represents prescriptions

**The percentage of the total number of products was calculated as a percentage for the whole year. e.g. 51826 divided by 199976 this value is then multiplied by 100 to get a percentage.

The d-value calculated revealed no practical significant differences between the average cost per dermatological product for the different four-monthly intervals (January to December 2001 and 2004).

5.5.2. COST ANALYSIS OF THE DERMATOLOGICAL PRODUCTS

The average cost per prescription for dermatological products fluctuated during the different time periods. In 2004 and especially in the last period from September to December 2004, the average cost per prescription decreased by 22.88 % (Refer to table 5.8), although the d-value revealed no practical significant difference between the average cost per prescription of the different time periods.

The average cost per dermatological product decreased by 13.59 % from R135.65±173.74 (during January to April 2004) to R117.21±113.87 (during September to December 2004). The average cost of dermatological products therefore decreased overall, which reflects the goal of the pricing regulations in order to lower medicine prices to improve accessibility to the public. The d-value between the average cost per dermatological product was very small (< 0.8). No practical significance differences between the different four-monthly periods occurred (Refer to paragraph 4.3.2.5.6).

Anti-acne products were the third most frequently claimed dermatological group claimed during 2001 and 2004 representing 15.10 % (n = 51 436) of the total number of dermatological products

(N = 340 677). The anti-acne products were the most expensive dermatological group with a cost-prevalence index of 1.5 and 1.6 respectively for 2001 and 2004. The total cost of the anti-acne products represented 22 % (n = R 4 159 438.63) of the total cost of dermatological products (N = R 18 913 889.92) during 2001 and 24.3 % (n = R 6 557 239.24) during 2004 (N = R 27 025 540.48) (Refer to tables 5.9 and 5.10).

The cost-prevalence index of corticosteroids indicated that these products are relatively expensive (>1) (refer to table 5.9.). The prevalence of the corticosteroids was the highest of all the dermatological products, with a frequency of 44.95 %, 46.0 % and 46.8 % during the 2001 study intervals. There was a decrease of 27.22 % in the prevalence of corticosteroids from 2001 (N = 64 531) to 2004 (N = 82 095). The total cost of the corticosteroids amounted to 50.02 % (n = R9 460 701.88) of the total cost of dermatological products claimed during 2001 (N= 18 913 889.92). The total cost of the corticosteroids during 2004 was R11 114 436.73, which represents 41.17 % of the total cost of the dermatological products (N = 27 025 540.48). The total cost of the corticosteroids amounted to R20 575 138.61, which represents 44.79 % of all dermatological products (N = 45 939 430.40) during 2001 and 2004. Out of the above statistics the total cost decreased during the study periods from 2001 to 2004 (Refer to table 5.9).

The cost-prevalence value for antibacterial and the antifungal groups was less than one, which indicated that the products in these groups were not expensive (Refer to paragraph 4.3.2.5.5.). The antibacterial products and the antifungal products represented 5.40 % (n = R 1 020 976.87) and 14.16 % (n = R 2 678 527.80) of the total cost of dermatological products respectively during the 2001 (N = R 18 913 889.92) study periods. During the 2004 (N = R 27 025 540.48) study periods the antibacterial products represented 5.73 % (n = R 1 547 733.66) of the total cost of dermatological products. The antifungal products represented 14.73 % (n = R 3 981 185.08) of the total cost of dermatological products during the 2004 study periods (Refer to tables 5.9 and 5.10).

The prevalence of the antibacterial products represented 13.74 % (n = 19 329) and 13.06 % (n = 26 113) respectively for the 2001 (N = 140 701) and 2004 (N = 199 976) study periods. The antifungal medicine products had a slightly higher prevalence during the two study years, 2001 and 2004 representing 17.36 % (n = 24 426) and 18.66 % (n = 37 322) respectively.

The number and type of products prescribed can play a role in the total cost at the end of the periods. For example if the more expensive products were claimed it could influence the total cost at the end of the period.

The following data were obtained from appendix B: The cost of dermatological products remained constant over the 2001 and 2004 study periods. The maximum number of products per prescription was six. The average cost of all dermatological products during January to April 2004 (R153.65 ± 173.74) showed a decrease of 23.29 %, which amounted to (R117.87 ± 105.42) during September to December 2004. The decrease was due to the pricing regulations implemented on 2nd of May 2004. The effect of the pricing regulations could be observed in the September to December 2004 interval, which was the post implementation interval where the average cost per product was lower. No practical significant decrease was found in the average cost per product (Refer to table B3 & table 5.11).

Table 5.9: Cost analysis of the dermatological groups during 2001.

Explanation	**January to April 2001**		**May to August 2001**		**September to December 2001**	
Total number of products	N **(N = 51273)**	N % ***	N **(N = 46461)**	N % ***	N **(N = 42967)**	N % ***
Antibacterial	7 344	14.32	6 150	13.24	5 835	13.38
Antifungal	9 189	17.92	7 846	16.89	7 391	17.20
Anti-acne	7 895	15.40	7 404	15.94	5 751	13.58
Corticosteroids	23 049	44.95	21 374	46.0	20 108	46.80
Others *	3 796	7.40	3 687	7.94	3 882	9.03
Average cost of dermatological product groups (R)	**January to April 2001 (R)**		**May to August 2001 (R)**		**September to December 2001 (R)**	
Antibacterial	52.61 ± 36.94		52.47 ± 38.37		53.46 ± 33.18	
Antifungal	110.08 ± 66.99		108.10 ± 70.47		110.79 ± 74.01	
Anti-acne	178.13 ± 253.77		206.13 ± 311.65		213.34 ± 323.48	
Corticosteroids	144.44 ± 86.84		147.98 ± 85.71		147.64 ± 90.67	
Others *	140.24 ± 111.02		139.80 ± 107.33		140.77 ± 116.93	
Total cost (R)	**January to April 2001 (R)**		**May to August 2001 (R)**		**September to December 2001 (R)**	
Antibacterial	386 379.19		322 680.36		311 917.32	
Antifungal	1 011 533.25		848 134.9		818 859.65	
Anti-acne	1 406 308.87		1 526 221.77		1 226 907.99	
Corticosteroids	3 329 167.64		3 162 867.6		2 968 666.64	
Others *	532 339.45		515 428.27		546 476.59	
Cost-prevalence index**	**January to April 2001**		**May to August 2001**		**September to December 2001**	
Antibacterial	0.41		0.38		0.39	
Antifungal	0.85		0.79		0.81	
Anti-acne	1.37		1.5		1.56	
Corticosteroids	1.11		1.08		1.08	
Others *	1.08		1.02		1.03	

*It must be noted that a weighted average cost per product was calculated for the 'other' group.

**The cost-prevalence index was calculated from the cost percentage divided by the prevalence percentage for each time period.

*** The percentage was calculated by dividing the number of medicine products of a dermatological group by the total number of dermatological products, multiplied by a hundred. For example the number of anti-acne products for the period May to August 2001, divided by the total number of dermatological products claimed during that period multiplied by a hundred.

Table 5.10: Cost analysis of the dermatological groups during 2004.

Explanation	**January to April 2004**		**May to August 2004**		**September to December 2004**	
Total number of products	N **(N = 51826)**	N % ***	N **(N = 67689)**	N % ***	N **(N = 80461)**	N % ***
Antibacterial	7 175	13.84	9 262	13.68	9 676	12.03
Antifungal	10 059	19.41	12 331	18.22	14 932	18.56
Anti-acne	7 612	14.69	10 752	15.88	12 022	14.94
Corticosteroids	20 683	39.91	26 923	39.77	34 489	42.86
Others *	6 297	12.15	8 421	12.44	9 342	11.61
Average cost of dermatological product groups (R)	**January to April 2004 (R)**		**May to August 2004 (R)**		**September to December 2004 (R)**	
Antibacterial	63.69 ± 47.44		62.29 ± 52.47		53.10 ± 48.64	
Antifungal	121.62 ± 100.27		106.47 ± 152.71		96.77 ± 83.82	
Anti-acne	238.84 ± 248.29		238.27 ± 235.95		181.11 ± 144.46	
Corticosteroids	154.62 ± 104.4		139.5 ± 101.08		120.64 ± 83.11	
Others *	201.19 ± 130.54		169.05 ± 105.90		121.44 ± 67.32	
Total cost (R)	**January to April 2004 (R)**		**May to August 2004 (R)**		**September to December 2004 (R)**	
Antibacterial	457 009.62		576 904.20		513 819.84	
Antifungal	1 223 351.9		1 312 915.79		1 444 917.39	
Anti-acne	1 818 024.84		2 561 910.13		2 177 304.27	
Corticosteroids	3 197 966.09		3 755 758.07		4 160 712.57	
Others *	1 266 906.69		1 423 566.87		1 134 472.21	
**Cost-prevalence index ** **						
Antibacterial	0.41		0.44		0.45	
Antifungal	0.79		0.75		0.83	
Anti-acne	1.55		1.68		1.55	
Corticosteroids	1.01		0.98		1.03	
Others *	1.31		1.19		1.04	

* It must be noted that a weighted average cost per product was calculated for the 'other' group.

**The cost-prevalence index was calculated from the cost percentage divided by the prevalence percentage for each time period.

*** The percentage was calculated by dividing the number of medicine products of a dermatological group by the total number of dermatological products, multiplied by a hundred. For example the number of anti-acne products for the period May to August 2004, divided by the total number of dermatological products claimed during that period multiplied by a hundred.

Table 5.11: The d-value of the average cost per prescription of dermatological products during the study periods of 2001 and 2004.

MONTH	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.05	0.04	0.14	0.09	0.07
May to August 2001	0.05		0.004	0.09	0.04	0.15
September to December 2001	0.04	0.004		0.10	0.05	0.10
January to April 2004	0.14	0.09	0.10		0.05	0.2
May to August 2004	0.09	0.04	0.05	0.05		0.15
September to December 2004	0.07	0.15	0.10	0.2	0.15	

5.5.3. PREVALENCE AND COST OF THE DIFFERENT DERMATOLOGICAL PRODUCTS

The total cost of the corticosteroids ranged between 22.6 % and 25.7 % during 2004 while it ranged between 27.2 % and 28.9 % during 2001. This showed a decrease in the percentage of the total cost of what dermatological products represented. There was a decrease in the total cost of corticosteroids in combination with anti-infective agents by 11.78 % from R4 128 653.36 (2001) to R4 614 918.18 (2004). While the total costs of antifungal and antibacterial products were more or less constant over the same study period. The total cost of the anti-acne products increased by 33.61 % from R4 159 438.63 in 2001 to R5 557 239.24 in 2004 (See appendix B table B4).

The above-mentioned statistics showed that the prevalence of the different pharmacological groups of dermatological products remained more or less constant during 2001 and 2004. Only the corticosteroids and the corticosteroids in combination with anti-infective agents showed a decrease in prevalence. The decrease in the frequency could explain the decrease in the total cost of these products.

5.5.4. PREVALENCE OF DERMATOLOLGICAL PRODUCTS

This part of the study focuses on the prevalence of dermatological products. For the purpose of this study only dermatological medicine products with a prevalence of more than 10 % of the total number of dermatological products on the medical claims database were taken into account.

Bactroban® topical ointment was the product with the highest prevalence namely 8.39 % (n = 28 578) during the two study periods (N = 340 677) (Refer to table B5). It is a topical antibacterial product that can be used effectively in most bacterial infectious conditions (Refer to paragraph 2.16.3, 2.17.4 & 2.19.3.).

Corticosteroids have different potencies. It can be expected that the potency of the corticosteroid prescribed gives an indication of the severity of the disease or skin condition (Cheigh, 2005:1775). There might also be some prevalence and cost differences of these categories (see Appendix D, table D1).

Corticosteroids were the second most prescribed group of dermatologicals. The corticosteroids represented 43.04 % (n = 146 626) of all dermatological products (N = 340 677). The products that were most frequently prescribed were Quadriderm® cream and Elocon® cream. Both are medium potency corticosteroids (Refer to table D1). Quadriderm® is a combination product. The above-mentioned products had a prevalence of 8.44 % (n = 28 742) of all dermatological products (N = 340 677) on the database (Refer to table 5.12). A possible reason for this might be the wide variety of symptoms and skin conditions that can be treated successfully with them (Discussed in chapter 2). Misuse may also play a role. The cost-prevalence index of corticosteroids represented 1.09 and 1.00 during 2001 and 2004 respectively and indicated that this group was expensive (Refer table 5.13).

Lamisil® 15g cream had the highest prevalence of the antifungal products representing 5.60 % (n = 19 091) of all dermatological products (N = 340 677) during the study periods. The anti-fungal products represented 18.13 % (n = 61 748) of all dermatological products claimed during all the study periods (N = 340 677) (Refer to table 5.12). This may be due to the fact that fungal infections are very difficult to heal (Berger, 2003:96), resulting in a large number of products claimed. The cost-prevalence index for antifungal products indicated that this group was inexpensive (Refer to table 5.13)

The anti-acne products had a prevalence of more than 15.10 % (n = 51 435) of the total number of dermatological products (N = 340 677) prescribed during the study periods. The products NeoMedrol® acne lotion and Benzamycin® topical gel represented 20.88 % (n = 10 741) of the anti-acne products (N = 51 436) prescribed during the study periods. The cost-prevalence of

anti-acne products indicated that these products were very expensive with values of 1.47 and 1.60 respectively for 2001 and 2004.

Table 5.12: The total number of products for four-monthly study periods as well as for 2001 and 2004.

Month	Antibacterial products		Antifungal products		Corticosteroids		Anti-acne products	
	N	%	N	%	N	%	N	%
January to April 2001	7 344	5.22*	9 189	6.53*	23 049	16.38*	7 895	5.61*
May to August 2001	6 150	4.37*	7 846	5.58*	21 374	15.19*	7 404	5.26*
September to December 2001	5 835	4.15*	7 391	5.25*	20 108	14.29*	5 751	4.09*
January to April 2004	7 175	3.56#	10 059	5.03#	20 683	10.34#	7 612	3.81#
May to August 2004	9 262	4.63#	12 331	6.17#	26 923	13.46#	10 752	5.38#
September to December 2004	9 676	4.84#	14 932	7.47#	34 489	17.25#	12 022	6.01#
2001 in total	19 329	13.74*	24 426	17.36*	64 531	45.86*	21 050	14.96*
2004 in total	26 113	13.06#	37 322	18.66#	82 095	41.05#	30 386	15.19#

*The prevalence percentage was calculated from the total number of products for a specific group divided by the total cost of all dermatological products during 2001 (N = 140701) x100

#The prevalence percentage was calculated from the total number of products for a specific group and period divided by the total number of dermatological products during 2004 (N = 199976) x 100

Table 5.13: The cost-prevalence index of the different dermatological groups during the study periods of 2001 and 2004.

Dermatological groups	2001* or 2004#	N %	Cost %	Cost-prevalence index
Antibacterial	2001	13.74	5.40	0.39
	2004	13.06	5.39	0.41
Antifungal	2001	17.36	14.16	0.82
	2004	18.66	14.73	0.79
Corticosteroids	2001	45.86	50.02	1.09
	2004	41.05	41.13	1.00
Anti-acne	2001	14.96	21.99	1.47
	2004	15.19	24.26	1.60
Others	2001	8.08	8.43	1.04
	2004	12.03	14.15	1.18

*The N = 140 701 for the prevalence (N) % and the cost % N value is 18 913 889.92

#The N % is the prevalence with N = 199 976 and the cost % N =27 025 540.48.

The results indicated that the total number of corticosteroids increased by 27.22 % during 2001 (N = 64 531) to 2004 (N = 82 095). The total number of the anti-acne products increased by 44.35 % during 2001 (N = 21 050) to 2004 (N = 30 386). The total number of antibacterial products increased by 35.10 % from 2001 (N = 19 329) to 2004 (N = 26 113). The antifungal products increased by 52.80 % from 2001 (N = 24 426) to 2004 (N = 37 322). In this study the total number of anti-acne and antibacterial products remained more or less constant during the

study period (Refer to table 5.12). This can be due to increase in medical aid members or medical aids claiming through Interpharm® Datasystems or it can be that more patients used dermatological products.

Table 5.14: The prevalence and cost of the dermatological products during 2001 and 2004.

Month	N (%)*	Cost (%) **	Cost-prevalence index
January to April 2001	36.44	35.24	0.97
May to August 2001	33.02	33.71	1.02
September to December 2001	30.54	31.05	1.02
January to April 2004	25.92	29.50	1.14
May to August 2004	33.85	35.68	1.05
September to December 2004	40.24	34.94	0.87

*The prevalence percentage was calculated from the total number of dermatological products for each period divided by the total number of dermatological products for the year in which the period fell, multiplied by hundred.
**The cost percentage was calculated from the total cost of the dermatological products for a period divided by the total cost of the dermatological products for the year in which the period fell, multiplied by hundred.
***The totals of the year are values as well as the total values of the dermatological products can be found in table 5.1.

The cost-prevalence index of dermatological products decreased to below 0.9 during September to December 2004 (Refer to table 5.13). In the September to December 2004 interval the prevalence of the dermatological products increased to 40.24%. This may be the result of more skin problems or an increase in the number of members or medical aids claiming through Interpharm® Datasystems.

5.5.6. UTILISATION OF INNOVATOR AND GENERIC DERMATOLOGICAL PRODUCTS

There was an increase of 42.13 % in the number of dermatological products claimed during 2004 (N = 199 976) compared to 2001. The total number of innovator dermatological products prescribed increased by 35.79 % from 2001 (N = 121 249) to 2004 (N = 164 640). Innovator products represented 33.46 % (n = 66 917) during September to December 2004 compared to 27.99 % (n = 55 981) and 20.87 % (n = 41 742) during May to August 2004 and January to April 2004 compared to all dermatological products claimed (N = 199 976). (Refer to table 5.16).

There was an increase of 19.65 % in the average cost of the innovator dermatological products from January to April 2001 versus January to April 2004 while the generic equivalent in turn showed a notable increase of 65.49 % during the same intervals. This may be the result of the extended time frame during which the study was performed or can be contributed to the raising

medical inflation rate over the two-year study period. From September 2001 to December 2001 versus September 2004 to December 2004, there was a decrease in the average cost of 12.92 % for the innovator products and 15.34 % for the generic products, which may lead to the conclusion that the implementation of the new pricing regulations accomplished its goal by lowering the average cost of medicine (Refer to table 5.16).

The 2004 periods showed what impact the new pricing regulations had on the industry without bringing seasonal factors into consideration. In comparison to September 2004 to December 2004 versus January 2004 to April 2004 showed a decrease of 22.79 % in the innovator products while the generic products had a decrease of 43.44 % in the average cost per dermatological product. From May 2004 to August 2004, which fell in the implementation period, versus September 2004 to December 2004 the post implementation period, the average cost decreased by 16.46 % for the innovators and by 32.30 % for generics (Refer to table 5.16). The d-value that was calculated between the average cost per innovator versus generic products during all the intervals was not practically significant (Refer to table 5.17).

According to the results shown in table 5.16 the total number of products increased while the average cost per product decreased during the study periods. Before the implementation of the new pricing regulations there were increases in the average cost per dermatological products and the number of products, while in September 2004 to December 2004 there was a decrease in the average cost of dermatological products. The total number of innovators decreased and the total number of generics increased over the study period. This might be due to an increase in the number of patients with access to medical aid schemes.

Table 5.15: Percentage of innovator and generic dermatological products prescribed during 2001 and 2004.

Explanation	Innovator products (%)	Prevalence of innovator products	Generic products in (%)	Prevalence of generic products
January 2001 to April 2001	36.78 (N = 121 249)	44 579	34.41 (N = 19 452)	6 694
May 2001 to August 2001	33.06 (N = 121 249)	40 086	32.77 (N = 19 452)	6 375
September 2001 to December 2001	30.17 (N = 121 249)	36 584	32.81 (N = 19 452))	6 383
January 2004 to April 2004	25.35 (N = 164 640)	41 742	28.54 (N = 35 336)	10 084
May 2004 to August 2004	34.00 (N = 164 640)	55 981	33.13 (N = 35 336)	11 708
September 2004 to December 2004	40.64 (N = 164 640)	66 917	38.33 (N = 35 336)	13 544

According to the results in table 5.15 there was higher percentage of innovator products prescribed when compared to generic products used during 2001 and 2004. From 2001 until 2004 there was an increase of 81.66 % in the total number of dermatological generics claimed. During 2001 and 2004 more than 60 % of the dermatological products claimed were innovator products. The total number of the innovators had a prevalence percentage of 83.92 % (n = 285 889) of the total number of dermatological products (N = 340 677). This means that the generics represented 16.08 % (n = 54 788) of all dermatological products (N = 340 677) claimed during the study intervals (Refer to table 5.16).

Table 5.16: Average cost of all dermatological products according to innovator (I) and generic (G) items for 2001 and 2004.

Month	I* or G**	Number of products	Average cost per product (R)	Total cost (R)
January to April 2001	I	44 579	141.61+143.84	6 312 840.46
	G	6 694	52.72+45.06	352 887.94
May to August 2001	I	40 086	149.69+166.58	6 000 456.82
	G	6 375	58.80+48.76	374 876.08
September to December 2001	I	36 584	150.24+169.36	5 496 305.84
	G	6 383	58.99+53.23	376 522.78
January to April 2004	I	41 742	169.44 ± 168.21	7 072 821.43
	G	10 084	88.30 ± 180.88	890 437.71
May to August 2004	I	55 981	156.61 ± 167.30	8 767 298.50
	G	11 708	73.77 ± 154.25	863 756.56
September to December 2004	I	66 917	130.83 ± 111.81	8 754 803.79
	G	13 544	49.94 ± 99.09	676 422.49

*Innovator products claimed.
**Generic products claimed.

Table 5.17: D-value representing the average cost of innovator or generic products.

Months	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001	0.62	0.58	0.57	0.29	0.44	0.64
May to August 2001	0.58	0.55	0.54	0.34	0.46	0.60
September to December 2001	0.57	0.54	0.54	0.34	0.45	0.59
January to April 2004	0.29	0.34	0.34	0.45	0.57	0.71
May to August 2004	0.44	0.46	0.45	0.57	0.50	0.64
September to December 2004	0.64	0.60	0.59	0.71	0.64	0.72

*The d-value was calculated as follows: Average cost per innovator minus average cost per generic products divided by the highest standard deviation.

5.5.7. ACTIVE INGREDIENTS OF THE INDIVIDUAL DERMATOLOGICAL MEDICINE PRODUCTS

The usage and cost of active ingredients with a prevalence of 1 % or more were analysed in this section.

5.5.7.1. ANTI-BACTERIAL PRODUCTS

5.5.7.1.1. MUPUROCIN

The cost-prevalence index during 2001 for mupurocin was less than one and therefore the treatment is regarded as relatively inexpensive. During 2004 the cost-prevalence index was greater than one which indicated that the treatment now changed to relatively expensive (Refer to table 2D). The total cost of mupurocin represented 23.08 % (n = R 235 602.84) during January 2001 to April 2001, 18.76 % (n = R 191 496.74) during May 2001 to August 2001 and 18.84 % (n = R 192 401.95) during September 2001 to December 2001 of the antibacterials total cost for 2001 (N = R 1 020 976.87). Mupurocin containing products represented 17.76 % (n = R 274 828.09) during January to April 2004, 23.75 % (n = R 367 533.81) during May to August 2004 and 20.79 % (n = R 321 706.37) during September to December 2004 of the total cost of antibacterial products (N = R 1 547 733.66). The total cost of antibacterial products represented 3.28 % (n = R 619 501.53) and 3.57 % respectively (n = R 964 068.27) of all dermatological products claimed during 2001 (N = R 18 913 889.92) and 2004 (N = R 27 025 540.48). There was a slight increase in the total cost of mupurocin representing 60.68% (2001) and 62.29 % (2004) of the antibacterial products' total cost during the study periods of 2001 (N = R 1 020

976.87) and 2004 (N = R 1 547 733.66) respectively (Refer to table 2D). The total cost of this active ingredient represents 3.45 % (n = R 1 583 569.80) of the total cost of all dermatological products (N = R 45 939 430.40) (Refer to table 5.1 and table 2D).

The prevalence of anti-bacterial products showed an increase in the prevalence of mupurocin from 2001 to 2004, representing 25.18 % from 2001 (N = 12 691) to 2004 (n = 15 887). The prevalence of mupurocin represented 9.02 % (n = 12 691) and 7.94 % (n = 15 887) during all the periods of 2001 (N = 140 701) and 2004 (N = 199 976) respectively of the dermatological products (Refer to table 2D).

The d-values reflected that the differences in the average cost of mupurocin products between the different four-monthly intervals of 2001 and 2004 were less than 0.8 and therefore of no practical significance (Refer to table 3D).

In table 5.18 the average cost of the dermatological products during January to December of 2001 and 2004 increased by 38.72 %. From January to December 2004 the average cost per dermatological product decreased by 16.28 % and 20.67 % respectively during May to August and September to December versus January to April.

Table 5.18: Cost analysis of individual products containing mupurocin as active ingredient during January to December 2001 and 2004.

Months	Number of products	Average cost of mupurocin products (R)	Total cost (R)
January to April 2001	4 861	48.47 ± 20.14	235 602.84
May to August 2001	4 028	47.54 ± 18.04	191 496.74
September to December 2001	3 802	50.61 ± 24.23	192 401.95
January to April 2004	4 087	67.24 ± 31.22	274 828.09
May to August 2004	5 769	63.71 ± 41.22	367 533.81
September to December 2004	6 031	53.34 ± 34.94	321 706.37

5.5.7.2. ANTIFUNGAL PRODUCTS

5.5.7.2.1. TERBINAFINE HCl

Terbinafine HCl had a cost-prevalence index that varied between 1.07 and 1.32 during 2001 and 2004 respectively (Refer to table 4D). This indicated that treatment with terbinafine HCl was expensive. The total cost of terbinafine HCl containing products represented 13.11 % (n = R 351 273.44) during January to April 2001, 10.50 % (n = R 281 279.24) during May to August 2001 and 12.83 % (n = R 346 669.08) during September to December 2001 of the total antifungal cost (N = R 2 678 527.80). During 2004 the total cost of terbinafine was 15.01 % (n = R 597 463.59) during January to April, 16.96 % (n = R 675 270) during May to August and 20.59 % (n = R 819 651.90) during September to December of the total cost of antifungal products (N = R 3 981 185.08). The total cost of terbinafine HCl represented 36.45 % (n = R 976 220.76) and 52.56 % (n = R 2 092 385.49) respectively for 2001 (N = R 2 678 527.80) and 2004 (N = R 3 981 185.08) of the total cost of the antifungal products. This indicated an increase in the total cost of terbinafine HCl of 114.34 % from 2001 (n = R 976 220.76) to 2004 (n = R 2 092 385.49) of the total cost of the antifungal products (Refer to table 4D).

The average cost per Lamisil® product, which contains terbinafine HCl, increased during January to April versus May to August study periods for 2001 to 2004 by 25.31 % and 19.41 % respectively. During January to April 2004 versus September to December 2004 the average cost of terbinafine HCl products decreased by 19.63 % (Refer to table 5.19). The new pricing regulations that were implemented in the last study year on 2 May 2004 began to show an effect during the study periods after implementation (Refer to table 5.19). The d-value calculated revealed that the average cost of terbinafine HCl showed no practical significant decrease (<0.8) during the study periods, which the average cost per product decreased of 19.63 % (Refer to table 5D).

Terbinafine HCl was the second most frequently claimed dermatological product during the study periods January to December of 2001 and 2004 (Refer to table B5). The prevalence of terbinafine HCl increased from 33.43 % (n = 8 166) during 2001 to 42.17 % (n = 15 737) during 2004 of all the antifungal medicine products for the study years 2001 (N = 24 426) and 2004 (N = 37 322). Terbinafine HCl increased by 92.71 % from 2001 (N = 8 166) to 2004 (N = 15 737). This may also be a reason why the total cost of the product on the database increased. The

prevalence of terbinafine HCl compared to the total number of dermatological products represented 7.02 % (n = 23 903) during the study years of (N = 340 677) 2001 and 2004 (Refer to table 4D and paragraph 2.18).

Table 5.19: Cost analysis of individual medicine products containing terbinafine HCl as an active ingredient during January to December 2001 and 2004.

Months	Number of products	Average cost of terbinafine HCl products (R)	Total cost (R)
January to April 2001	2 976	118.04 ± 40.49	351 273.44
May to August 2001	2 389	117.74 ± 39.90	281 278.24
September to December 2001	2 801	122.70 ± 41.72	343 669.08
January to April 2004	4 039	147.92 ± 63.36	597 463.59
May to August 2004	4 803	140.59 ± 203.17	675 270
September to December 2004	6 895	118.88 ± 62.20	819 651.90

5.5.7.2.2. KETOCONAZOLE

Treatment with ketoconazole was considered to be relatively inexpensive with a cost-prevalence index of less than one (Refer to table 6D). The total cost of ketoconazole represented 1.40 % (n = R 645 400.61) of the total cost of dermatological products (N = R 45 939 430.40) during the study years 2001 and 2004. Ketoconazole represented 12.32 % (n = R 330 001.41), during the study periods of January to December 2001 (N = R 2 678 527.80) of the total cost of antifungal products. During the 2004 study periods of January to December 2004 ketoconazole represented 7.92 % (n = R 315 399.20) of the total antifungal cost for 2004 (N = R 3 981 185.08). There was a decrease in the total cost of ketoconazole of 4.42 % from 2001 (N = R 330 001.41) to 2004 (N = R 315 399.20) study periods, but there was no decrease in the prevalence of the number of ketoconazole products prescribed (Refer to table 6D).

The prevalence of ketoconazole represented 2.44 % (N = 8 325) of the total number of dermatological products (n = 340 677) claimed during the study periods. The frequency of ketoconazole represented 13.11 % (n = 3203) and 13.72 % (n = 5122) respectively of the antifungal medicine products claimed during 2001 (N = 24 426) and 2004 (N = 37 322). It was

found that the prevalence of ketoconazole was rather constant during the study periods (Refer to table 6D).

The average cost of the ketoconazole products decreased during all the study periods. The average cost of ketoconazole from January to April 2004 versus September to December 2004 showed a decrease of 31.55 % (Refer to table 5.20). This indicated that the new pricing regulations might have had an effect during the September to December 2004 study period (Refer to table 7D).

Table 5.20: Cost analysis of individual products containing ketoconazole as an active ingredient during January to December 2001 and 2004.

Months	Number of products	Average cost of ketoconazole products (R)	Total cost (R)
January to April 2001	1 339	106.01 ± 32.79	141 942.13
May to August 2001	1 171	107.32 ± 30.02	125 544.59
September to December 2001	693	102.27 ± 42.45	62 514.69
January to April 2004	1 173	79.85 ± 58.16	92 541.76
May to August 2004	1 870	72.28 ± 64.59	125 984.98
September to December 2004	2 079	54.66 ± 31.56	96 872.46

During the study periods of January to December 2001 of all three four-monthly periods compared to September to December 2004 the d-value revealed that there was practical significant differences between the average cost of ketoconazole products, thus constituted 1.57, 1.67 and 1.12 respectively. Therefore the new pricing regulation had an effect on the average cost of ketoconazole (Refer to table 7D).

5.5.7.3. CORTICOSTEROIDS AND COMBINATIONS THEREOF WITH OTHER ACTIVE INGREDIENTS

5.5.7.3.1. BETAMETHASONE IN COMBINATION WITH GENTAMYCIN

The cost-prevalence index of betamethasone in combination with gentamycin containing products for the different study periods varied between 1.44 and 1.62 (Refer to paragraph 4.3.2.5.5.). Therefore betamethasone in combination with gentamycin containing products were regarded as an expensive treatment (Refer to table 8D). The total cost for both study years of this combination represented 7.89 % (n = R 3 623 994.66) of the total cost of dermatological products (N = R 45 939 430.40). The total cost of this combination represented 18.56 % (n = R 1 756 103.59) and 16.81 % (n = 1 867 891.07) of the total corticosteroids cost during 2001 (N = 9 460 701.88) and 2004 (N = R 11 114 436.73) respectively. This indicated that treatment with these ingredients had major financial implications (Refer to table 8D). The average cost of the betamethasone combination products decreased by 23.20 % from January to April 2004 versus September to December 2004. From September to December 2001 till September to December 2004 the average cost per product decreased by 10.94 % (Refer to table 5.21).

The prevalence of betamethasone and gentamycin combination products represented 11.52 % (n = 16 890) of the total amount of corticosteroids (N = 146 626) during the study years. During 2001 (N = 64 531) the betamethasone combination products represented 12.76 % (n = 8234) of the total number of corticosteroids and 10.54 % (n = 8656) during 2004 (N = 82 095). There was a decrease in the prevalence of claims for this combination ingredient of 5.13 % from 2001 (N = 8 234) to 2004 (N = 8 656). The prevalence of these active ingredients represented 4.96 % (n = 16 890) compared to the total number of dermatological products (N = 340 677). There was a decrease in the total cost of betamethasone combinations products as well as the prevalence of these active ingredients over the study periods (Refer to table 8D).

Table 5.21: Cost analysis of individual medicine products containing betamethasone in combination with gentamycin as active ingredients during January to December 2001 and 2004.

Months	Number of products	Average cost of this combination product (R)	Total cost (R)
January to April 2001	3 115	212.48 ± 43.31	661 890.48
May to August 2001	2 686	214.57 ± 41.18	576 345.39
September to December 2001	2 433	212.85 ± 37.06	517 867.72
January to April 2004	2 136	246.82 ± 65.25	527 199.68
May to August 2004	2 877	225.97 ± 77.82	650 127.72
September to December 2004	3 643	189.56 ± 59.67	690 563.67

Table 9D shows that during January to April 2004 and September to December 2004 the d-values had practical significant differences between the average cost of the betamethasone combination products. The other d-values were calculated but were not practically significant.

5.5.7.3.2. MOMETASONE

Mometasone containing products were considered to be expensive according to the cost-prevalence index being greater than one (Refer to table 10D & Refer to paragraph 4.3.2.5.5.). The total cost of mometasone containing products decreased during the study period from 9.73 % (n = R 1 841 218.97) to 6.91 % (n = R 1 867 891.07) during 2001 (N = R 18 913 889.92) to 2004 (N = R 27 025 540.48) when compared to of the total cost of dermatological products. The total cost of mometasone containing products compared with the total cost of the corticosteroids represented 18.03 % (n = R 3 709 110.04) during the study periods (N = R 20 575 138.61) (Refer to table 10D). The total cost of mometasone containing products increased by 1.45 % from 2001 (N = R 1 841 218.97) to 2004 (N = R 1 867 891.07). The average cost of mometasone containing products decreased during the study periods except during January to April 2001 and 2004 when the average cost increased by 5.41 %. The average cost of mometasone containing products decreased with 25.69 % during January to April 2004 versus September to December 2004 (Refer to table 5.22).

The prevalence of the mometasone containing products decreased from 7.62 % (n = 10 725) in 2001 (N = 140 701) to 5.46 % (n = 10 916) in 2004 (N = 199 976) of all the dermatological products. These products represented 16.62 % during 2001 (N = 64 531) and 13.30 % during 2004 (N = 82 095) of all corticosteroid products claimed. There was an increase of 27.22 % in mometasone containing products claims from 2001 (N = 64 531) to 2004 (N = 82 095) (Refer to table 10D).

Table 5.22: Cost analysis of individual dermatological products containing mometasone as an active ingredient during January to December 2001 and 2004.

Months	Number of products	Average cost of mometasone products (R)	Total cost (R)
January to April 2001	3 921	176.48±92.10	691 963.84
May to August 2001	3 596	170.56±79.52	613 326.49
September to December 2001	3 208	167.06±79.38	535 928.64
January to April 2004	2 697	186.03±80.56	501 716.21
May to August 2004	3 694	163.20±76.74	602 849.81
September to December 2004	4 525	138.23±65.63	625 502.77

There was no practical significant difference in the d-values calculated between the average cost of mometasone containing products during the four-monthly intervals of 2001 and 2004 (Refer to table 11D).

5.5.7.3.3. METHYLPREDNISOLONE ACEPONATE

Treatment with methylprednisolone aceponate aceponate was considered to be expensive with cost-prevalence values greater than one. During the study periods January to April 2001 and September to December 2001 the cost-prevalence was less than one and therefore treatment during those periods was considered to be inexpensive (Refer to table 12D). The total cost of methylprednisolone aceponate containing products represented 13.77 % (n = R 2 832 271.87) of the total corticosteroid cost (N = R 20 575 138.61). The total cost of these products was 5.87 % (n = R 1 111 038.22) during 2001 (N = R 18 913 889.92) and 6.37 % (n = R 1 721 233.65) during 2004 (N = R 27 025 540.48) of the total cost of all dermatological products (Refer to table 12D). The average cost of methylprednisolone aceponate containing products decreased by

19.31 % during January to April 2004 versus September to December 2004. During January to April 2001 and 2004 the average cost of methylprednisolone aceponate containing product increased by 35.40 % (Refer to table 5.23). The d-value calculated for methylprednisolone products indicated that no practical significant difference exists between the average cost per product during the different study periods (< 8) (Refer to table 13D).

The prevalence of the methylprednisolone aceponate aceponatecontaing products represented 5.54 % (n = 18 861) during all the study periods (N = 340 677). Methylprednisolone aceponate aceponate containing products represented 12.86 % (n = 18 861) for both study years of all corticosteroid products (N = 146 626) (Refer table 12D). The prevalence of methylprednisolone aceponate increased by 53.61 % from 2001 (N = 7 437) to (N = 11 424).

Table 5.23: Cost analysis of individual medicine products containing methylprednisolone aceponate as active ingredient during January to December 2001 and 2004.

Months	Number of products	Average cost of this products (R)	Total cost (R)
January to April 2001	2 363	137.57±59.39	325 785.87
May to August 2001	2 565	151.58±56.01	388 812.70
September to December 2001	2 509	158.01±58.11	396 439.65
January to April 2004	2 660	186.27±84.41	489 130.24
May to August 2004	3 570	159.92±89.51	561 962.50
September to December 2004	5 194	150.30±69.59	670 140.91

5.5.3.4. BETAMETHASONE IN COMBINATION WITH CLOTRIMAZOLE

The cost-prevalence index of betamethasone in combination with clotrimazole containing products was greater than 1.42 during the study periods. Therefore treatment with betamethasone in combination with clotrimazole products was relatively expensive (Refer to table 14D). The total cost of the combination represented 3.08 % (n = R 582 368.48) and 2.18 % (n = R 589 165.21) respectively of the total cost of dermatological products during 2001 (N = R 18 913 889.92) and 2004 (N = R 27 025 540.48). The total cost of the active ingredients compared to the total cost of corticosteroids products (N = R 20 575 138.61) represented 5.69 % (n = R 1 171 533.69) during the study periods (Refer to table 14D). The average cost of betamethasone in combination with clotrimazole during the 2004 study periods decreased by 25.41 % and 20.43 % respectively for the January to April and May to August versus September

to December study periods (Refer to table 5.24). The d-value for 2004 of the average cost of combination had a practical significant effect when it was compared to the average cost for the same periods during 2001 (Refer to table 15D).

The prevalence of betamethasone in combination with clotrimazole products represented 1.50 % (n = 5123) of the total dermatological products (N = 340 677) during the study period of 2001 and 2004. The prevalence of that combination represented 4.01 % (n = 2 586) during 2001 (N = 64 531) and 3.09 % (n = 2537) during 2004 (N = 82 095) of all corticosteroid products. The prevalence increased by 1.89 % from 2001 (N = 2 586) to 2004 (N = 2 537). The prevalence was very low but this may be ascribed to the high cost of these products (Refer to table 14D).

Table 5.24: Cost analysis of individual products containing betamethasone in combination with clotrimazole during January to December 2001 and 2004.

Months	Number of products	Average cost of this combination products (R)	Total cost (R)
January to April 2001	1 016	223.79±42.37	227 369.55
May to August 2001	864	226.98±48.54	196 113.92
September to December 2001	706	225.05±41.98	158 885.01
January to April 2004	547	269.74±55.73	147 549.33
May to August 2004	798	252.86±60.84	201 784.58
September to December 2004	1 192	201.20±54.33	239 831.30

5.5.7.3.5. ISOCONAZOLE NITRATE WITH DIFLUCOTOLONE VALERATE

The cost-prevalence indices during 2001 were 1.10; 1.11 and 1.23 respectively for the three four-monthly intervals, which indicated that treatment with isoconazole combined with diflucotolone valerate can be regarded as being expensive during these study periods. During 2004 the cost prevalence indices increased to 1.54; 1.55 and 1.48 respectively for the four-monthly periods, which indicated that the treatment became even more expensive (Refer to table 16D). The total cost of isoconazole combined with diflucotolone valerate products represented 4.80 % (n = R 2 205 913.50) of the total cost of all dermatological products (N = R 45 939 430.40). Thus active ingredients represented 11.31 % (n = R 1 069 679.71) and 10.22 % (n = R 1 136 233.79) respectively of the total cost of the all corticosteroid products during 2001 (N = R 94 060 701.88) and 2004 (N = R 11 114 436.73) (Refer to table 16D). The total cost of this active

ingredient increased by 6.22 % from 2001 (N = 1 069 679.71) to 2004 (N = 1 126 233.79). The average cost of the isoconazole combination products decreased by 24.64 % during January to April 2004 versus September to December 2004 (Refer to table 5.25). This indicated that the so-called "19 % saving" claimed by authorities might be accurate in this instance.

The prevalence of isoconazole combined with diflucotolone valerate products represented 3.45 % (n = 11 745) of the total number of dermatological products (N = 340 677) during 2001 and 2004. These combination products represented 9.64 % (n = 6222) for 2001 (N = 64 531) and 6.73 % (n = 5523) for 2004 (N = 82 095). The prevalence decreased by 11.23 % from 2001 (N = 6 222) to 2004 (N = 5 523) (Refer to table 16D).

The d-values calculated between the average cost of the combination products showed practical significant differences between the January to April and May to August four-monthly periods for 2001 and 2004. Therefore there was a practical significant decrease in the average cost per product during January to August 2001 and January to August 2004 (Refer to table 17D).

Table 5.25: Cost analysis of individual medicine products containing isoconazole in combination with diflucotolone valerate as an active ingredient during January to December 2001 and 2004.

Months	Number of products	Average cost of this combination products (R)	Total cost (R)
January to April 2001	2 238	158.21±37.52	354 079.23
May to August 2001	2 029	163.78±37.51	332 309.96
September to December 2001	1 955	196.06±52.89	383 290.52
January to April 2004	1 429	237.51 ± 55.43	339 403.35
May to August 2004	1 726	216.09 ± 51.80	372 972
September to December 2004	2 368	178.99 ± 46.82	423 858.44

5.5.7.4. ANTI-ACNE PRODUCTS

5.5.7.4.1. ISOTRETINOIN

Isotretinoin treatment during 2001 was found to be expensive with cost-prevalence index values exceeding 4.40 (Refer to table 18D). The total cost of the isotretinoin products represented 8.57 % (n = R 3 936 484.85) during the study period of the total dermatological cost (N = R 45 939 430.40). The total cost of isotretinoin products represented 9.34 % (n = R 612 192.21) during January to April 2004, 15.32 % (n = R 1 004 783.24) during May to August 2004 and 11.29 % (n

= R 740 462.97) during September to December 2004 of the dermatological products during 2004 (N = R 6 557 239.24) respectively. The total cost of isotretinoin containing products represented 37.96 % (n = R 1 579 046.43) during 2001 (N = R 4 159 438.63) and 35.95 % (n = R 1 247 438.42) during 2004 (N = R 6 557 239.24) respectively. There was a 70.01 % decrease in the total cost of these products from 2001 (N = R 4 159 438.63) to 2004 (N = R 1 247 438.42) (Refer to table 18D).

The prevalence of the isotretinoin was not very high during the study periods (varied between 0.99 % and 4.58%). It represented 2.88 % (n = 9 797) of all the dermatological products (N = 340 677) during the study years. It further represented 8 % (n = 1 683) during 2001 (N = 210 501) and 26.70 % (n = 8114) during 2004 (N = 30 386) of the total for anti-acne products. The prevalence of isotretinoin increased by 382.12 % from 2001 (N = 1 683) to 2004 (N = 8 114) (Refer table 18D).

Table 5:26: Cost analysis of individual medicine products containing isotretinoin as an active ingredient during January to December 2001 and 2004.

Months	Number of products	Average cost of this products (R)	Total cost (R)
January to April 2001	510	854.29±683.80	435 685.55
May to August 2001	622	999.13±660.68	621 457.18
September to December 2001	551	947.19±681.27	521 903.70
January to April 2004	1 689	535.73±503.14	612 192.21
May to August 2004	3 097	424.64±400.71	1 004 783.24
September to December 2004	3 328	237.05±234.94	740 462.97

5.5.7.4.2. ADAPALENE

The cost-prevalence index of adapalene containing products was less than one for all the four-monthly periods during 2001 and 2004 and therefore treatment was inexpensive except for September to December 2004 where it was more than one (Refer to table 20D). The total cost of adapalene represented 9.49 % (n = R 394 652.53) and 13.04 % (n = R 854 918.58) of the total cost of anti-acne products during 2001 (N = R 4 159 438.63) and 2004 (N = R 6 557 239.24) respectively. The total cost of adapalene containing products increased with 116.63 % from 2001 (N = R 394 652.53) to 2004 (N = R 854 918.58). The average cost per product decreased

by 10.76 % during January to April 2004 versus September to December 2004 (Refer table 18D and table 5.26).

The prevalence of the adapalene containing products claims represented 13.80 % (n = 2 904) during 2001 (N = 21 050) and 14.05 % (n = 4 270) during 2004 (N = 30 386) of the anti-acne products that were claimed (Refer table 19D). Adapalene represented 2.06 % (n = 2 904) during 2001 (N = 140 701) and 2.14 % (n = 4 270) during 2004 (N = 199 976) of the total number of dermatological products respectively. The prevalence increased by 47.04 % from 2001(N = 2 904) to 2004 (N = 4 270) (Refer to table 18D).

Table 5.27: Cost analysis of individual medicine products containing adapalene as active ingredient during January to December 2001 and 2004

Months	Number of products	Average cost of adapalene products (R)	Total cost (R)
January to April 2001	1 028	132.16±18.28	135 861.64
May to August 2001	1 080	135.06±12.66	145 865.98
September to December 2001	796	141.87±13.46	112 924.91
January to April 2004	1 092	211.90±38.11	231 395.12
May to August 2004	1 397	205.24±41.14	286 720.46
September to December 2004	1 781	189.11±43.44	336 803

The d-value of adapalene had practical significance where the four-monthly intervals of 2001 and 2004 were compared, while the other values had no practical significant effect difference on the average cost per product (Refer to table 21D).

5.5.7.4.3. BENZOYL PEROXIDE IN COMBINATION WITH ERYTHROMYCIN

The products of benzoyl peroxide in combination with erythromycin were considered to be expensive treatment, except for the period May to August 2001 and September to December 2001 where the cost-prevalence index was less than one and inexpensive (Refer to table 22D). There was an increase in the total cost of the benzoyl peroxide in combination with erythromycin

products of 102.78 % from 2001 (N = R 445 052.72) to 2004 (N = R 902 469.08). The total cost of the combination products represented 2.93 % (n = R 1 347 520.80) of the total cost of dermatological products on the database (N = R 45 939 430.40). The combination product represented 10.70 % (n = R 445 052.72) during 2001 (N= R 4 159 438.63) and 13.76 % (n = R 902 469.08) during 2004 (N = R 6 557 239.24). The average cost of the combination product decreased by 10.78 % during January to April 2004 versus September to December 2004 (Refer to table 22D and table 5.27).

The prevalence of the combination varied during all the study periods, but represented 1.46 % (n = 4 975) of all dermatological products (N = 340 677) claimed. There was an increase in the prevalence of these active ingredients of 9.21 % from 2001 (N = 2 378) to 2004 (N = 2 597). The prevalence of these products in the anti-acne group represented 9.67 % (n = 4 975) of all anti-acne products (N = 51 436). Claims for the anti-acne products decreased from 11.30 % (n = 2 378) to 8.55 % (n = 2 597) during 2001 (N = 21 050) to 2004 (N = 30 386) (Refer to table 22D).

Table 5.28: Cost analysis of individual medicine products containing benxoyl peroxide in combination with erythromycin as active ingredients during January to December 2001 and 2004

Months	Number of products	Average cost this combination products (R)	Total cost (R)
January to April 2001	904	180.04±14.98	162 757.32
May to August 2001	833	186.00±23.23	154 933.93
September to December 2001	641	198.69±14.96	127 360.47
January to April 2004	761	359.72±81.87	273 748.04
May to August 2004	879	365.86±72.19	321 592.88
September to December 2004	957	320.93±78.35	307 128.16

The d-value of benzoyl peroxide combined with erythromycin products had practical significance during the study periods of 2004 and September to December 2001 on the average cost of this active ingredient. This may be the result of the changed price structure that was implemented during 2004 (Refer to table 5.28 and table 23D).

5.5.7.4.4. METHYLPREDNISOLONE WITH NEOMYCIN

Treatment with methylprednisolone in combination with neomycin was considered inexpensive during the study periods because the cost-prevalence index was less than one (Refer to table 24D). The total cost of this combination product decreased from 23.04 % (n = R 336 250.22) during 2001 (N = R 1 459 438.63) to 3.59 % (n = R 235 240.36) during 2004 (N = R 6 557 239.24). The period where the total cost was the lowest was during May to August 2004 where it was less than 0.94 % (n = R 74 544.26) of the total cost of dermatological products (N = R 7 963 259.14) (Refer to table 24D). The average cost decreased by 17.86 % during January to April 2004 versus September to December 2004. The d-value calculated had no practical significance for methylprednisolone combined with neomycin's average cost during the different study periods (Refer to table 5.29 and table 25D).

The combination product represents 1.69 % (n = 5 766) of all the dermatological medicine products (N = 340 677) during both study years. The prevalence of the combination products represented 16.22 % (n = 3 415) and 7.74 % (n = 2 351) of all the anti-acne products during 2001 (N = 21 050) and 2004 (N = 30 386). The prevalence of these products also decreased from 2001 (N = 3 415) to 2004 (N = 2 351) by 31.16 % (Refer to table 24D).

Table 5.29: Cost analysis of individual medicine products containing methylprednisolone in combination with neomycin as an active ingredient during January to December 2001 and 2004.

Months	Number of products	Average cost of this combination products (R)	Total cost (R)
January to April 2001	1 419	98.71±32.19	140 065.35
May to August 2001	1 115	97.15±34.01	108 319.86
September to December 2001	881	99.73±33.28	87 865.01
January to April 2004	716	110.61±51.09	79 200.07
May to August 2004	738	101.01±42.16	74 544.26
September to December 2004	897	90.85±37.30	81 496.03

5.6. PREVALENCE AND COST OF THE COMBINATION DERMATOLOGICAL PRODUCTS

5.6.1. MONOTHERAPY

The prevalence of the dermatological groups for single therapy in this study represented more than 79.53 % (n = 270 926) of the total number of dermatological products that were claimed (N = 340 677). The corticosteroids represented 49.78 % (n = 134 873) of monotherapy in this study (N = 270 926). The antifungal, antibacterial and anti-acne products represented 16.35 % (n = 23 003), 13.47 % (n = 18 956) and 11.47 % (n = 16 132) respectively during 2001 (N = 140 701). The total cost of the monotherapy products represented 5.29 % (n = R 1 000 232.67) for the antibacterial, 13.46 % (n = R 2 545 751.82) for the antifungal, 43.17 % (n = R 8 166 034.58) for the corticosteroids and 16.78 % (n =R 3 174 160.97) for the anti-acne products during 2001 (N = R 18 913 889.92). The cost-prevalence index indicated that the anti-acne products were expensive during 2001 (Refer to table 5.30).

Table 5.30: Prevalence, cost and cost-prevalence index values of dermatological products utilised as monotherapy during 2001.

2001	Antibacterial		Antifungal		Corticosteroids		Anti-acne	
Prevalence		%		%		%		%
January to April (N = 46 114)	7 224	15.67	8 568	18.58	21 094	45.74	6 128	13.29
May to August (N = 41 708)	6 030	14.46	7 399	17.74	19 644	47.10	5 620	13.47
September to December (N = 38 625)	5 702	14.76	7 036	18.22	22 153	57.35	4 384	11.35
Total Cost (R)		%		%		%		%
January to April (N = 6 665 728.40)	379 885.29	5.70	937 049.56	14.06	2 589 695.56	38.85	1 072 987.67	16.10
May to August (N = 6 375 332.90)	316 128.84	4.96	831 966.00	13.05	2 889 910.19	45.33	1 177 596.73	18.47
September to December (N = 5 872 828.62)	304 218.54	5.18	776 736.26	13.23	2 686 428.83	45.74	923 576.57	15.73
Cost-prevalence index								
January to April	0.36		0.76		0.85		1.21	
May to August	0.34		0.74		0.96		1.37	
September to December	0.35		0.73		0.80		1.39	

The prevalence of the corticosteroids used as monotherapy was the highest with 36 % (n = 71 982) of the dermatological products (N = 199 976) during 2004. The antifungal, antibacterial and anti-acne products were 17 % (n = 34 003) January to April 2004, 12.21 % (n = 24 425) May to August 2004 and 9.77 % (n = 19 534) September to December 2004 respectively (N = 199 976). The total cost of the dermatological products in monotherapy represented 21.15 % (n = R 5 716 442.62) for the antibacterial, 13.45 % (n = R 3 634 834.16) for the antifungal, 36.27 % (n = R 9 803 116.73) for the corticosteroids and 15.79 % (n = R 4 267 952.15) for the anti-acne products during 2004 (N = R 27 025 540.48). The cost-prevalence index indicated that the anti-acne products were expensive during the four-monthly intervals of 2004 (Refer to table 5.31).

Table 5.31: Prevalence, cost and cost-prevalence index values of dermatological products utilised as monotherapy during 2004.

2004	Antibacterial		Antifungal		Corticosteroids		Anti-acne	
Prevalence		%		%		%		%
January to April (N = 46 340)	6 981	15.06	9 569	20.65	19 169	41.37	5 548	11.97
May to August (N = 59 606)	8 664	14.54	11 173	18.74	23 742	39.83	6673	11.20
September to December (N = 71 166)	8 780	12.34	13 261	18.63	29 071	40.85	7 313	10.28
Total Cost (R)								
January to April (N = 7 963 259.14)	440 916.02	5.54	1 162 415.83	14.60	2 961 107.65	37.18	1 326 953.85	16.66
May to August (N = 9 631 055.06)	545 556.19	5.66	1 181 527.64	12.27	3 312 755.96	34.40	1 587 635.12	16.48
September to December (N = 9 431 226.28)	4 729 970.41	4.91	1 290 890.69	37.69	3 529 253.12	37.42	1 353 363.18	14.35
Cost-prevalence index								
January to April	0.37		0.70		0.90		1.39	
May to August	0.39		0.65		0.86		1.47	
September to December	0.40		0.73		0.92		1.40	

5.6.2. DOUBLE THERAPY AND COMBINATIONS WITH MORE THAN TWO PRODUCTS

Fewer combination products were prescribed during 2001 and 2004. The costs of combination therapy were greater than one and therefore relatively expensive (Refer table 5.32 5.33, & paragraph 4.3.2.5.5.). The corticosteroids and the anti-acne products were the dermatological products where combinations were most frequent, showed the most double therapy representing 2.04 % (n = 6 960) and 1.92 % (n = 6 524) respectively of all dermatological products (N = 340 677) claimed. Together the antifungal and antibacterial products represented 0.67 % (n = 2 296) and 0.29 % (n = 1 004) of all dermatological products (N = 340 677). The cost-prevalence of the dermatological products, corticosteroids and anti-acne products in combination, indicated that these products were expensive during the 2001 study periods. The antifungal products were

expensive during the four-monthly intervals May to December 2001. The total cost of the double therapy represented 9.98 % (n = R 1 887 450.25) during 2001 (N = R 18 913 889.92). (Refer to table 5.32).

Table 5.32: Prevalence, cost and cost-prevalence index of dermatological products utilised as double therapy during 2001.

2001	**Antibacterial**		**Antifungal**		**Corticosteroids**		**Anti-acne**	
Prevalence		%		%		%		%
January to April (N = 46 114)	60	0.13	306	0.66	829	1.80	831	1.80
May to August (N = 41 708)	60	0.14	216	0.52	823	1.97	848	2.03
September to December (N = 38 625)	62	0.13	173	0.45	652	1.69	813	2.10
Total Cost (R)		%		%		%		%
January to April (N = 6 665 728.40)	6 493.90	0.10	73 115.92	1.10	230 407.39	3.46	316 027.54	4.74
May to August (N = 6 375 332.90)	6 551.52	0.10	46 667.17	0.73	261 607.91	4.10	335 626.82	5.26
September to December (N = 5 872 828.62)	6 232.81	0.11	40 815.65	0.69	269 640.10	4.59	294 263.52	5.01
Cost-prevalence index								
January to April	0.77		0.15		1.92		2.63	
May to August	0.71		1.40		2.08		2.59	
September to December	0.85		1.53		2.72		2.43	

The prevalence of the antibacterial, antifungal, corticosteroids and the anti-acne products in double therapy were respectively 0.41 % (n = 822), 0.80 % (n = 1 601), 2.33 % (n = 4 656) and 2.02 % (n = 4 032) during 2004 (N =199 976). Double therapy represented 12.48 % (n = R3 371 456.07) of the total cost of 2004 (N = R27 025 540.48). The cost-prevalence index of the antifungal, corticosteroids and anti-acne products indicated that these groups were expensive during the four-monthly intervals of 2004 (Refer to table 5.33).

Table 5.33: Prevalence, cost and cost-prevalence index of dermatological products utilised as double therapy during 2004.

2004	Antibacterial		Antifungal		Corticosteroids		Anti-acne	
Prevalence		%		%		%		%
January to April (N = 46 340)	112	0.24	233	0.50	698	1.51	871	1.88
May to August (N = 59 606)	289	0.69	570	1.37	1 478	2.48	1 490	2.50
September to December (N = 71 166)	421	0.59	798	1.12	2 480	3.48	1 671	2.35
Total Cost (R)		%		%		%		%
January to April (N = 7 963 259.14)	13 460.18	0.17	56 912.09	0.71	219 374	2.75	418 696.95	5.26
May to August (N = 9 631 055.06)	30 344.07	0.32	129 353.97	1.34	418 322.33	4.34	726 194.85	7.54
September to December (N = 9 431 226.28)	38 285.82	0.41	146 714.39	1.56	583 018.35	6.18	590 779.07	6.26
Cost-prevalence index								
January to April	0.71		1.42		1.82		2.80	
May to August	0.46		1.02		1.75		3.02	
September to December	0.69		1.39		1.78		2.66	

The frequency of the combinations with three or more items was not very common and presented with a prevalence of 0.39 % (n = 1 345) of all dermatological products (N = 340 677). The total cost of these combinations was 1.63 % (n = R 748 741.05) of the total cost of dermatological products (N = 45 939 430.04). The cost-prevalence index indicated that these combinations were expensive. These combinations did not occur as often as the monotherapy and the double therapy, therefore only a small amount of patients would need to carry the financial burden of these combinations (Refer to appendix E).

5.7. CHAPTER SUMMARY

In this chapter the results were discussed. The prevalence of the dermatological products and the cost analyses of these products were looked at. The active ingredients as well as combination therapies also received attention in this section. The conclusion follows in the next chapter.

CHAPTER 6
CONCLUSION AND RECOMMENDATIONS

6.1. INTRODUCTION

A conclusion was drawn from the literature review and empirical results. The recommendations derived from the study on the usage patterns of dermatological products will be discussed. Limitations encountered during the study are also discussed.

6.2. CONCLUSION

In order to ensure that the set aims were achieved, the conclusion drawn with regard to each objective will be discussed briefly:

- *The first specific aim was to present a brief overview of the anatomy of the skin.*

A brief overview was given on the anatomy of the skin. Illustrations and short discussions were used to describe the skin structures and explain the different skin layers and their functions. The skin is divided into three layers namely the epidermis, dermis and the subcutaneous tissue. A description of the anatomy of the skin is important because most of the dermatological products are applied to the skin (see paragraph 2.1).

- *The second specific aim was to describe nail abnormalities and pruritus as dermatological problems.*

Many problems are related to the skin. Mainly infections and allergic reactions are present. The nail can have some abnormalities such as onycholysis, koilonychias, pitting of the nail and white streak fungal infection of the nail. In many cases these symptoms are related to the presence of some other disease. Pruritus is mostly present at night and can affect quality of life (see paragraph 2.2).

- *The third specific aim was to describe from the literature the different dermatological diseases that account for more than 10 % of all dermatological products on the medicine claims database, while at the same time referring to their treatments.*

The different dermatological diseases with their etiology, clinical presentation, treatment and complications were reviewed. This was accomplished by using different literature references. The dermatological diseases discussed were the ones that were treated with antibacterial (refer to paragraphs 2.16, 2.17 & 2.19), antifungal (refer to paragraph 2.18),

corticosteroids (refer to paragraphs 2.3 to 2.14) and anti-acne products (refer to paragraphs 2.13 & 2.15).

- *The fourth specific aim was to briefly look at the relationships between the different health care concepts.*

In chapter 3 a flow diagram which illustrates the relationship between the different health care concepts was given. Managing the health care system plays an important role in pharmacies and in facilitating rational use of medicines (refer to paragraph 3.2).

- *The fifth specific aim was to define the essence of managed health care.*

Managed health care would include any kind of health care services which are paid for, all or in part by a third party, including any government entity and for which the focus of any part of clinical decision making is other than between the practitioner and the client or patient (Cohen, 2003:34). It demonstrates better control on health care professionals to work effectively and control clinical and financial risk assessment and management of health care, with a view to facilitating appropriateness and cost-effectiveness of relevant health services. Attention was paid to the definition, objective and South African perspective of managed health care (refer to paragraphs 3.3 & 3.2.1).

- *The sixth specific aim was to present a brief description of disease management, case management, outcomes management and component management.*

Disease management consists of drug utilisation review, evidence–based medicine, pharmaco-economics and pharmaco-epidemiology (refer to paragraph 3.2.3.). Case management is managing health care by constructing and developing plans, until they can be implemented and evaluated (refer to paragraph 3.2.4.). Outcomes management has its focus on results. The information that was obtained from the relevant analyses is used to improve health care (refer to paragraph 3.2.5.). Component management is based on a broader view of a condition or situation or health care system. It takes more areas of a health care system into account than, for example, merely the costs incurred from prescription drugs. It often shifts the costs from the pharmaceutical component to other areas of the system, increasing the total health care spending (Levy & Cocks, 1999:1). This managing of health care does not always lead to cost-savings or may even worsen the cost for patients (refer to paragraph 3.2.6.).

- *The seventh specific aim was to investigate what the South African prospective of managed health care is.*

Managed health care would probably be very effective in South Africa if implemented correctly. According to the Medical Schemes Act, Act 131 of 1998, managed health care means clinical and financial risk assessment and management of health care, with a view to facilitating appropriateness and cost-effectiveness of relevant health services within the constraints of what is affordable, through the use of rules-based and clinical management-based programmes (refer to paragraph 3.3.4).

- *The eighth specific aim was to state briefly what pharmaceutical care entails.*

Pharmaceutical care can be defined as the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life (Hepler & Strand, 1989:S7) (refer to paragraph 3.4).

- *The ninth specific aim was to give a brief overview of what the concept of drug utilisation review refers to.*

Drug utilisation review (DUR) is an authorised, structured, ongoing review of practitioner prescribing, pharmacist dispensing and patient use of medication (Weber, 1999). The following can be described as advantages of drug utilisation review: It focuses on preventing drug-related problems in future and feedback on drug usage is very important to reduce cost and drug usage frequency. The different types of DURs were described: Prospective drug utilisation review is initiated by the pharmacist, who reviews prescriptions at the point of sale for potential problems (Kidder & Bae, 20:107) (refer to paragraph 3.4.4.1.); and retrospective drug utilisation evaluates medicine on a prescription after it had been dispensed (refer to paragraph 3.4.4.2.); while concurred drug utilisation review is used for long term and maintenance therapy at periodic intervals (refer to paragraph 3.4.4.3.).

- *The tenth specific aim was to describe what evidence based medicine is.*

According to scientific analyses of previously recorded information certain drug usage problems or proven advantages can be identified. The problems can be addressed through processes of seeking solutions. It involves integrating clinical expertise with the best available external evidence gained from systematic research. It also involves considering the values and expectations of clients (Gambrill, 1999:2) (refer to paragraph 3.6).

- *The eleventh specific aim was to describe pharmaco-epidemiology.*

Pharmaco-epidemiology is primarily concerned with adverse drug reactions in a population. It focuses on pharmaceutical care and the identification of potential or current drug-related problems. The goal of pharmaco-epidemiology is to optimise medicine usage and to limit drug usage problems (refer to paragraph 3.7).

- *The twelfth specific aim was to discuss the essence of pharmacoeconomics.*

Pharmacoeconomic studies are becoming more important with the increase in medicine and health costs. Pharmacoeconomic studies contribute through the cost assessment of products and services associated with health care as well as decision making. The five types of economic evaluation methods were described; cost-minimisation, cost-effectiveness, cost-benefit analysis, cost-utility analysis and cost of illness (refer to paragraph 3.8.).

- *The thirteenth specific aim was to determine the usage patterns and costs of the dermatological products in the private health care sector of South Africa.*

It was found that dermatological products represented one of the top ten groups claimed, representing 4.13 % (n = 340 677) of all medicine products (N = 8 257 208) (See chapter 5, paragraph 5.4). Of the usage patterns of the individual dermatological products studied, only the dermatological products with a prevalence of more than 10 % on the database were reviewed.

The groups in dermatology with a prevalence of more than 10 % were the antibacterial, antifungal, corticosteroids and the anti-acne products. The corticosteroids proved to be the dermatological group with the highest prevalence, i.e. 43.04 % (n = 146 626) of all dermatological product groups (N = 340 677) with a total cost of 1.98 % (n = R20 575 138.61) of the total cost of all dermatological cost (N = R1 040 931 635). The antifungal and antibacterial products were found to be relatively inexpensive. The prevalence for the antifungal and antibacterial products was 18.13 % (n = 61 748) and 13.34 % (n = 45 442) respectively. The anti-acne products had a prevalence of 15.10 % (n = 51 436) and they had the highest cost per product of all four dermatological groups (see paragraph 5.5.1).

The costs of the four dermatological groups were respectively 5.59 % (n = R2 568 710.53) (antibacterial), 14.50 % (n = R 6 659 712.88) (antifungal), 44.79 % (n = R20 575 138.61)

(corticosteroids) and 23.33 % (n = R 10 716 677.87) (anti-acne) of the total cost of all dermatological products (see paragraph 5.5.2.).

- *The fourteenth specific aim was to determine the cost of the dermatological products according to the new single exit price structure that came into effect on the 2nd of May 2004 and what cost savings there had been.*

There was a decrease in the average cost of dermatological products in general during this study period, especially during the last interval of September to December 2004. The dermatological products also showed a decrease in the average cost per product during the 2004 study periods (see paragraph 5.5.2.).

- *The fifthteenth specific aim was to determine the prevalence and costs associated with innovator and generic equivalents of dermatological products mentioned in this study.*

An analysis of dermatological products according to innovator and generic classification showed that the majority of dermatological products prescribed during the two study years were the innovator products. The innovators had a prevalence of 83.92 % (n = 285 889) and represented a total cost of 92.31 % (n = R 42 404 526.84). The utilisation of the generic dermatologicals reflected a prevalence of 16.08 % (n = 54 778) with a cost of 7.69 % (n = R 3 534 903.56). The antibacterial products consisted of 12.13 % (n = 41 340) of innovators and 1.22 % (n = R 4 154.29) of generics. The antifungals consisted of 13.98 % (n = R 47 632.22) and 4.15 % generics (n = R 14 145.64). Corticosteroids consisted of 34.12 % innovators (n = R 116 254.69) and 8.91 % generics (n = R 30 345.49). The anti-acne innovator products (n = R 49 227.26) represented 14.45 % and the generics 0.65 % (n = R 2 205.71). This indicated a greater need for more generic anti-acne products on the market. During all the study intervals the innovators had a greater prevalence than the generics in dermatological products (see paragraph 5.5.6.).

- *The sixteenth specific aim was to investigate the prevalence and costs of combination therapy in dermatology.*

Dermatological therapy consisted mostly of monotherapy (this is when only one product was on the database). The results revealed that combination therapy (when more than one product were prescribed at the same time) consisted between two to eight dermatological products. The cost of combination therapy was relatively expensive according to the cost-prevalence index which was more than one. The frequency of therapy with two or more products was not very frequent and very high in cost (see paragraph 5.6.).

6.2. RECOMMENDATIONS:

Based only on the results of this study where the study periods of 2001 and 2004 were compared the following recommendations can be made:

- The number of innovators exceeds 75 % of the dermatological products versus the generics. Therefore it may be recommended that more generic dermatological products are needed on the market (refer to paragraphs 5.4.2. & 5.5.6.).
- The corticosteroids have shown a decrease in the prevalence of these products, but there must be looked into the diagnoses and what had been prescribed. This product group is still the most frequently used group in dermatology. Therefore it can be recommended that further studies on these products can be performed.
- Lamisil® is a popular product being used very often, future studies may be addressed in the development of resistance for this products.
- More generics are needed in anti-acne products which may decrease the cost of acne treatment.
- The cost and usage of these dermatological products must be considered to make them more affordable to all people.
- Very few drug utilisation studies have to date been conducted on the usage patterns and cost analysis of dermatological products in South Africa and it is, therefore, recommend that more drug utilisation studies should be done.
- Future studies could be launched with regard to the misuse of dermatological products
- Future studies could be performed on what products may have developed resistance due to the fact of misuse.
- Development of an advanced database, which will make integration of economic and clinical data possible will be a great advantage. It is recommended that such a database is used for diagnoses and be applied in pharmaco-epidemiology.

6.3. LIMITATIONS DURING THIS STUDY

A number of limitations were encountered during the course of the research study. These limitations could possibly have had an effect on the results and conclusions obtained through this

study and should thus be taken into account when evaluating the results and conclusions. The following limitations were found in this study:

- All data entered into the database after data refinement were considered precise and correct (refer to paragraph 4.3.2.1).
- All medicine items and prices on the database were considered to be correctly submitted (refer to paragraph 4.3.2.1.).
- The database did not contain information on the diagnoses of patients, patients' history, and their claimed levels of severity.
- The cost-prevalence index is only limited to cost and does not provide information on the patient's clinical outcomes (refer to paragraph 4.3.2.4.5.).
- The amounts and the percentages that were calculated from the database were only valid for the medical aids that claim through this database. Therefore this cannot be used as a true indication of dermatological usage patterns nor will it reflect the true cost of dermatological usage in South Africa as a whole (refer to paragraph 4.3.2.1.).
- If the ICD-10 code had been on the prescriptions, the research could have been extended to investigate realistic prescribing, misuse of drugs and dosage problems.

6.4. CHAPTER SUMMARY

The study was concluded in this chapter and discussed. All the objectives and research questions were attended to. The recommendations that were derived in completion of this study, as well as the limitations that were encountered during the course of the study have been discussed. This chapter closes this study.

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APPENDIX A

Table A1: Average medicine cost of all medicine products claimed per prescription during January to December for 2001 and 2004.

Month	Prevalence of medicine products	Average cost (R)	Total cost (R)
January to April 2001	966 161	130.07±149.27	125 667 469
May to August 2001	1 225 367	123.42±141.96	138 897 443
September to December 2004	859 798	133.92±166.71	115 143 577
January to April 2004	1 363 585	145.89±283.72	198 934 122
May to August 2004	1 953 845	124.23±208.03	242 721 616
September to December 2004	1 988 452	110.42±202.84	219 567 408

Table A2: Average number of all medicine items claimed per prescription.

Month	Total number of Rx*	Average number of products / Rx*	Total cost (R)
January to April 2001	481 029	2.01±1.18	966 161
May to August 2001	548 598	2.05±1.2	1 225 367
September to December 2004	4 457 536	1.93±1.13	859 798
January to April 2004	713 475	1.91±1.21	1 363 585
May to August 2004	935 644	2.09±1.29	1 953 845
September to December 2004	946 135	2.1±1.30	1 988 452

*Prescription

Table A3: The average cost per prescription of all the medicine on the database that is claimed from 2001 and 2004 in the four-month intervals.

Month	Amount of Rx*	Average cost (R)	Total cost (R)
January to April 2001	481 029	261.25±271.95	125 667 469
May to August 2001	548 598	253.19±256.82	138 897 443
September to December 2001	445 753	258.31±286.64	115 143 577
January to April 2004	713 475	278.82±476.38	19 834 122
May to August 2004	935 644	259.42±370.98	242 721 616
September to December 2004	946 135	232.07±354.89	219 567 408

* Prescriptions

Table A4: The d-value of the average cost per product of all products on the database.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.04	0.02	0.06	0.03	0.10
May to August 2001	0.04		0.06	0.08	0.004	0.06
September to December 2001	0.02	0.06		0.04	0.05	0.12
January to April 2004	0.06	0.08	0.04		0.08	0.13
May to August 2004	0.03	0.004	0.05	0.08		0.07
September to December 2004	0.10	0.06	0.12	0.13	0.07	

Table A5: The d-value of the average cost per prescription of all medicine products during 2001 and 2004.

	January to April 2001	**May to August 2001**	**September to December 2001**	**January to April 2004**	**May to August 2004**	**September to December 2004**
January to April 2001		0.03	0.01	0.05	0.01	0.11
May to August 2001	0.03		0.02	0.10	0.02	0.08
September to December 2001	0.01	0.02		0.08	0.004	0.10
January to April 2004	0.05	0.10	0.08		0.07	0.18
May to August 2004	0.01	0.02	0.004	0.07		0.11
September to December 2004	0.11	0.08	0.10	0.18	0.11	

Table A6: Average cost per group of the top 10 main pharmacological groups claimed for 2001.

Month	Main group	N*	Average cost (R)	Total cost (R)
January	Central nervous system	10 8735	162.39±164.38	17 657 007.34
To April	Respiratory	116 185	87.74±93.59	10 194 499.55
2001	Anti-microbicals	134 652	147.95±177.34	19 922 296.68
	Analgesics	104 086	68.03±74.3	7 081 002.9
	Cardiovascular system	86 746	214.92±110.57	18 643 743.8
	Endocrine system	66 855	135.83±174.5	9 081 172.71
	Gastro-intestinal track	65 446	158.64±178.34	10 382 174.38
	Musculo-skeletal agents	62 090	124.11±111.39	7 706 026.37
	Dermatologicals	51 273	130±138.39	6 665728.4
	Ear, nose and throat	49 251	107.78±74.52	5 308 113.74
May to	Central nervous system	108 753	165.18±167.88	1 7963 963.4
August	Respiratory	201 839	77.21±81.21	1 5584 569.21
2001	Anti-microbicals	168 891	141.6±138.91	2 3915 515.52
	Analgesics	123 192	64.05±63.93	7 889 937.77
	Cardiovascular system	94 512	217.83±113.58	20 587 310.69
	Endocrine system	74 574	133.27±172.99	9 938 548.78
	Gastro-intestinal track	60 930	157.68±189.48	9 607 570.49
	Musculo-skeletal agents	61 506	123.17±110.02	7 575 614.57
	Dermatologicals	46 461	137.22±158.88	6 375 332.9
	Ear, nose and throat	63 813	101.38±74.28	6 469 344.51
September	Central nervous system	89 401	168.54±170.16	1 5067 216.87
To	Respiratory	108 544	94.6±101.98	102 668 048.5
December	Anti-microbicals	112 038	146.85±155.58	16 453 310.62
2001	Analgesics	88 132	66.83±68.92	5 890 222.46
	Cardiovascular system	94 512	217.83±113.58	20 587 310.69
	Endocrine system	68 272	139.36±183.32	9 514 097.92
	Gastro-intestinal track	52 509	152.01±183.38	7 981 632.68
	Musculo-skeletal agents	50 763	128.75±106.98	6 535 626.6
	Dermatologicals	42 967	136.68±160.92	5 872 828.62
	Ear, nose and throat	46 009	114.28±78.25	5 257 879.28

*Is the prevalence of medicine products in the specific pharmacological groups that where claimed.

Table A7: Average cost per group of the top 10 main pharmacological groups claimed for 2004.

Month	Main group	N*	Average cost (R)	Total cost (R)
January to	Central nervous system	128 169	193.17±227.81	24 758 206.54
April 2004	Respiratory	142 835	102.18±146.78	14 594 715.28
	Anti-microbicals	14 9033	151.18±188.41	22 531 109.42
	Analgesics	112 820	63.6±86.44	7 175 345.71
	Cardiovascular system	203 413	206.23±111.69	41 950 474.27
	Endocrine system	128 845	162.81±260.1	20 977 558.33
	Gastro-intestinal track	79 135	176.29±551.32	13 950 710.51
	Musculo-skeletal agents	82 500	153.74±163.27	12 683 279.52
	Dermatologicals	51 826	153.65±173.74	7 963 259.14
	Ear, nose and throat	57 546	105.73±79.02	60 841 087.1
May to	Central nervous system	156 546	170.19±203.82	26 642 120.25
August	Respiratory	286 615	72.33±135.77	20 730 622.72
2004	Anti-microbicals	268 850	154.44±196.17	41 520 575.48
	Analgesics	178 563	53.41±65.03	9 537 224.57
	Cardiovascular system	239 798	182.4±107.4	43 738 731.52
	Endocrine system	149 812	145.01±244.22	21 723 821.31
	Gastro-intestinal track	100 825	155.76±296.55	15 704 299.79
	Musculo-skeletal agents	111 411	124.26±139.09	13 844 443.38
	Dermatological	67 689	142.28±168.06	9 631 055.06
	Ear, nose and throat	92 981	88.77±69.72	8 253 496.04
September	Central nervous system	172 285	137.26±165.25	23 648 265.87
To	Respiratory	199 304	73.88±100.59	14 724 675.28
December	Anti-microbicals	264 574	138.89±194.21	36 747 211.46
2004	Analgesics	173 459	47.67±60.74	8 269 456.38
	Cardiovascular system	282 567	149.82±89.99	42 334 022.38
	Endocrine system	166 896	123.81±203.81	20 663 660.51
	Gastro-intestinal track	114 863	125.97±222.4	14 469 057.35
	Musculo-skeletal agents	114 161	97±117.17	11 073 878.22
	Dermatologicals	80 461	117. 21±113.87	9 431 226.28
	Ear, nose and throat	85 373	84.25±63.35	7 192 996.68

*Is the prevalence of medicine products in the specific pharmacological groups that where claimed

APPENDIX B

Table B1: Average cost per dermatological prescription for the different study periods of 2001 and 2004.

Month	Total number of Rx*	Average cost (R)	Total cost (R)
January to April 2001	46 114	144.55 ± 161.35	6 665 728.40
May to August 2001	41 708	152.86 ± 183.02	6 375 332.90
September to December 2001	38 625	152.05 ± 187.61	5 872 828.62
January to April 2004	46 340	171.84 ± 201.35	7 963 259.14
May to August 2004	59 606	161.58 ± 198.36	9 631 055.06
September to December 2004	71 166	132.52 ± 135.07	9 431 226.28

*Prescriptions

Table B2: Average cost per product in dermatology for the different study periods of 2001 and 2004.

Month	Number of Dermatological agents	Average cost / product (R)	Total cost (R)
January to April 2001	51 273	130+138.39	6 665 728.40
May to August 2001	46 461	137.22+158.88	6 375 332.90
September to December 2001	42 967	136.68+160.92	5 872 828.62
January to April 2004	51 826	153.65 ± 173.74	7 963 259.14
May to August 2004	67 689	142.28 ± 168.06	9 631 055.06
September to December 2004	80 461	117.87 ± 105.42	9 431 226.28

Table B4: The prevalence of the sub-pharmacological dermatological group for 2001 and 2004.

Explanation		Jan to Apr 2001	May to Aug 2001	Sept to Dec 2001	Jan to Apr 2004	May to Aug 2004	Sept to Dec 2004
Corticosteroids	P*	14 168	13 694	13 055	14 315	18 654	23 604
	P%	27.63	29.47	30.38	27.62	27.56	29.34
	C**	1 815 713.31	1 821 906.7	1 694 428.51	1 898 346.92	2 182 026.77	2 419 144.86
	C%	27.24	28.58	28.85	23.84	22.66	25.65
Corticosteroids with	P*	8 881	7 680	7 053	6 368	8 269	10 885
anti-infective agent	P%	17.32	16.53	16.41	12.29	12.22	13.53
	C**	1 513 454.33	1 340 960.9	1 27 238.13	1 299 619.17	1 573 731.30	1 741 567.71
	C%	22.71	21.03	21.7	16.32	16.34	18.47
Antifungal	P*	9 189	7 846	7 391	10 059	12 331	14 932
	P%	17.92	16.89	17.2	19.41	18.22	18.56
	C**	1 011 533.25	8 481 34.9	818 859.65	1 223 351.90	1 312 915.79	1 444 917.39
	C%	15.18	13.3	13.94	15.36	13.63	15.32
Anti-acne	P*	7 895	7 404	5 751	7 612	10 752	12 022
	P%	15.4	15.94	13.38	14.69	15.88	14.94
	C**	1 406 308.87	1 526 221.77	1 226 907.99	1 818 024.84	1 561 910.13	2 177 304.27
	C%	21.1	23.94	20.89	22.83	16.22	23.09
Antibacterial	P*	7 344	6 150	5 835	7 175	9 262	9 676
	P%	14.32	13.24	13.58	13.84	13.68	12.03
	C**	386 379.19	322 680.36	311 917.32	457 009.62	576 904.20	513 819.84
	C%	5.8	5.06	5.3	5.74	5.99	5.45
Other	P*	3 796	3 687	38 82	6 297	8 421	9 342
	P%	7.4	7.9	9.02	12.15	12.44	11.61
	C**	532 339.45	515 428.27	546 476.59	1 266 906.67	1 423 566.87	1 134 472.21
	C%	7.99	8.08	9.31	15.91	14.78	12.03

*P is for the prevalence of the sub-pharmacological groups in dermatology and the
P % is the Percentage of these sub-pharmacological groups
**Cost of the sub-pharmacological group in Rand value
Cost % is the percentage of the cost

Table B5: The prevalence of the dermatological products which were more than 1 % according to there trade names in the different four monthly periods.

Monthly intervals	Prevalence	Prevalence %	Trade names
January to April 2001	4 861	9.48	Bactroban® topical ung
	2 644	5.16	Quadriderm® cream
	2 584	5.04	Elocon ® 0.1 % cream
	2 397	4.67	Lamisil® 1% 15g cream
	2 238	4.36	Travocort® cream
	1 458	2.84	Advantan® cream
	1 419	2.77	Neo-medrol® acne lotion
	1 016	1.98	Lotriderm® cream
	906	1.77	Nizshampoo®
	904	1.76	Benzamycin® topical gel
	794	1.55	Skinoren® cream
	783	1.53	Procutan® 1% cream
	782	1.53	Differin® .1% gel
	757	1.48	Daktacort® cream
	747	1.46	Persivate® cream
	736	1.44	Dovate® cream
	670	1.31	Pevaryl® cream
	657	1.28	Elocon® .1 % ung
	614	1.20	Advantan® ung
	574	1.12	Lamisil® 30ml top spray
	546	1.06	Elocon® .1% lotion
	523	1.02	Fucidin® ung
May to August 2001	4 028	8.67	Bactroban® topical ung
	2 301	4.95	Elocon® .1% cream
	2 292	4.93	Quadriderm® cream
	2 029	4.37	Travocort® cream
	1 979	4.26	Lamisil® 1% 15g cream
	1 411	3.04	Advantan® cream
	1 115	2.40	Neo-medrol® acne lotion
	864	1.86	Lotriderm® cream
	833	1.79	Benzamycine® topical gel
	800	1.72	Procutan® 1% cream
	731	1.57	Nizshampoo®
	731	1.57	Persivate® cream
	728	1.57	Differin® .1% gel
	725	1.56	Daktacort® cream
	694	1.49	Skinoren® cream
	653	1.41	Advantan® ung
	604	1.30	Dovate® cream
	588	1.27	Elocon® .1% ung
	562	1.21	Pevaryl® cream
	497	1.07	Elocon® .1% lotion
	472	1.02	Dovate® ung
September to December 2001	3 802	8.85	Bactroban® topical ung
	2 305	5.36	Lamisil ®1% 15g cream
	2 075	4.83	Quadriderm® cream
	1 980	4.61	Elocon® .1% cream
	1 955	4.55	Travacort ®cream
	1 452	3.38	Advantan® cream
	881	2.05	Neo-medrol® acne lotion
	749	1.74	Procutan® 1% cream
	706	1.64	Lotriderm® cream
	676	1.57	Persivate® cream
	641	1.49	Benzamycin® topical gel

Table B5: The prevalence of the dermatological products which were more than 1 % according to there trade names in the different four monthly periods.

Monthly intervals	Prevalence	Prevalence %	Trade names
	590	1.37	Dovate® cream
	583	1.36	Daktacort® cream
	566	1.32	Advantan® ung
	563	1.31	Differin® .1% gel
	509	1.18	Elocon® .1% ung
	504	1.17	Pevaryl® cream
	458	1.07	Skinoren® cream
	442	1.03	Mylocort® cream
	435	1.01	Dovate® ung
	432	1.01	Lamisil® 30ml topical spray
January to April 2004	4 087	7.89	Bactroban® top ung
	3 312	6.39	Lamisil® 1% 15g cream
	1 811	3.49	Elocon® .1% cream
	1 764	3.40	Quadriderm® cream
	1 489	2.87	Advantan® cream
	1 429	2.76	Travacort® cream
	806	1.56	Persivate® cream
	761	1.47	Benzamycin® topical gel
	738	1.42	Mylocort® cream
	723	1.40	Differin® .1% gel
	716	1.38	Neo-medrol® acne lotion
	699	1.35	Roaccutane® 10mg capsule
	632	1.22	Zineryt® 30ml lotion
	625	1.21	Advantan® ung
	594	1.15	Dactacort® cream
	580	1.12	Dovate® cream
	547	1.06	Lotriderm® cream
	546	1.05	Lamisil® 30ml topical spray
	521	1.01	Ketazole® cream
May to August 2004	5 769	8.52	Bactroban® top ung
	3 748	5.54	Lamisil® 1% cream
	2 571	3.80	Elocon® .1% cream
	2 400	3.55	Quadriderm® cream
	2 036	3.01	Advantan® cream
	1 736	2.56	Roaccuatane® 10mg capsule
	1 726	2.55	Travacort® cream
	1 062	1.58	Dalacin®T lotion
	1 011	1.49	Differin® .1% gel
	986	1.46	Zineryt ®30ml lotion
	979	1.45	Persivate® cream
	879	1.30	Benzamycin® topical gel
	857	1.27	Mylocort® cream
	836	1.24	Daktacort® cream
	798	1.18	Lotriderm® cream
	797	1.16	Advantan® ung
	738	1.09	Neo-medrol® acne lotion
	723	1.07	Dovate® cream
	686	1.01	Adco-dermed®shampoo
September to December 2004	6 031	7.50	Bactroban® topical ung
	5 350	6.65	Lamisil® 1% 15g cream
	3 260	4.05	Elocon® .1% cream
	3 060	3.80	Quadriderm® cream
	3 029	3.76	Advantan® cream
	2 368	2.94	Travacort® cream

Table B5: The prevalence of the dermatological products which were more than 1 % according to there trade names in the different four monthly periods.

	1 883	2.39	Roaccutane® 10mg capsule
	1 419	1.76	Differin® .1% gel
	1 192	1.48	Lotriderm® cream
	1 150	1.43	Advantan® ung
	1 150	1.43	Persivate® cream
	1 108	1.38	Dovate® cream
	1 083	1.35	Mylocort® cream
	1 047	1.30	Dalacin® T lotion
	1 007	1.25	Daktacort® cream
	957	1.19	Benzamycin® topical gel
	936	1.16	Zineryt® 30ml lotion
	897	1.11	Neo-medrol® acne lotion
	859	1.07	Dovate® ung

Table B6: The cost of dermatological products with a prevalence of more than 1 % during the different four monthly periods for 2001.

Monthly intervals	Trade name	Average cost (R)	Total cost (R)
January to April 2001	Bactroban® topical ung	48.47 ± 20.14	235 602.84
	Quadriderm® cream	213.69 ± 41.15	564 988.57
	Elocon® .1% cream	157.19 ± 51.75	406 178.32
	Lamisil® 1% 15g cream	110.52 ± 39.32	264 911.50
	Travocort® cream	158.21 ± 37.52	354 079.23
	Advantan ®cream	134.43 ± 57.64	196 003.27
	Neo-medrol® acne lotion	98.71 ± 32.19	140 065.35
	Lotriderm® cream	223.79 ± 42.37	227 369.55
	Nizshampoo®	92.17 ± 23.53	83 510.38
	Benzamycin® topical gel	180.04 ± 14.98	162 757.32
	Skinoren® cream	126.69 ± 16.41	100 590.75
	Procutan® 1% cream	136.77 ± 27.73	107 089.47
	Differin® .1% gel	132.52 ± 20.64	103 633.81
	Daktacort® cream	153.28 ± 33.12	116 031.68
	Persivate® cream	43.99 ± 72.46	32 862.63
	Dovate® cream	79.49 ± 38.56	58 505.36
	Pevaryl® cream	128.72 ± 37.99	86 240.31
	Elocon® .1 % ung	157.40 ± 54.70	103 410.39
	Advantan® ung	137.75 ± 53.08	84 579.95
	Lamisil®30ml topical spray	149.16 ± 28.51	85 618.95
	Elocon® .1% lotion	297.11 ± 164.49	162 223.08
	Fucidin® ung	74.77 ± 17.26	39 104.67
May to August 2001	Bactroban® topical ung	47.54 ± 18.04	191 496.74
	Elocon® .1% cream	158.10 ± 50.15	363 790.57
	Quadriderm® cream	215.65 ± 39.31	494 262.86
	Travocort® cream	163.78 ± 37.51	332 309.96
	Lamisil® 1% 15g cream	111.74 ± 38.67	221 124.18
	Advantan® cream	149.66 ± 58.36	211 169.72
	Neo-medrol® acne lotion	97.15 ± 34.01	108 319.86
	Lotriderm® cream	226.98 ± 48.54	196 113.92
	Benzamycine® topical gel	186 ± 23.23	154 933.93
	Procutan® 1% cream	137.18 ± 30.63	109 743.85
	Nizshampoo®	91.58 ± 15.98	66 943.75
	Persivate® cream	44.94 ± 50.39	32 852
	Differin® .1% gel	135.47 ± 12.17	98 624.84
	Daktacort® cream	154.89 ± 34.33	112 293.08
	Skinoren® cream	129.59 ± 18.68	89 935.99
	Advantan® ung	151.26 ± 49.59	98 770.53
	Dovate® cream	99.96 ± 45.86	60 376.15
	Elocon® .1% ung	163.39 ± 61.61	96 071.79
	Pevaryl® cream	139.95 ± 23.98	78 649.63
	Elocon® .1% lotion	247.26 ± 145.28	122 889.94
	Dovate® ung	108.12 ± 58.29	51 031.29
September to December 2001	Bactroban® top ung	50.61 ± 24.23	192 401.95
	Lamisil ®1% 15g cream	116.59 ± 39.80	268 747.78
	Quadriderm® cream	214.14 ± 35.16	444 340.06
	Elocon® .1% cream	156.76 ± 50.02	310 383.18
	Travacort® cream	196.06 ± 52.89	383 290.52
	Advantan® cream	155.75 ± 57.49	226 144.50
	Neo-medrol® acne lotion	99.73 ± 33.28	87 865.01
	Procutan® 1% cream	103.48 ± 71.60	77 506.42

Table B6: (Continue) The cost of dermatological products with a prevalence of more than 1 % during the different four monthly periods for 2001.

	Lotriderm® cream	225.05 ± 41.98	158 885.01
Month	**Trade name**	**Average cost (R)**	**Total cost (R)**
	Persivate® cream	43.71 ± 43.68	29 548.12
	Benzamycin® topical gel	198.69 ± 14.96	127 360.47
	Dovate® cream	107.28 ± 52.11	632 195.75
	Daktacort® cream	160.56 ± 39.74	93 608.30
	Advantan® ung	159.70 ± 59.03	90 387.89
	Differin® .1% gel	142.05 ± 13.53	79 972.26
	Elocon® .1% ung	157.75 ± 54.47	103 316.68
	Pevaryl® cream	140.05 ± 25.73	70 586.76
	Skinoren® cream	129.34 ± 21.55	59 238.86
	Mylocort® cream	49.18 ± 13.34	21 735.63
	Dovate® ung	116.98 ± 73.28	50 885.10
	Lamisil® 30ml topical spray	154.94 ± 37.71	66 933.45

Table B7: The cost of dermatological products with a prevalence of more than 1 % during the different four monthly periods for 2004.

Monthly intervals	**Trade name**	**Average cost (R)**	**Total cost (R)**
January to April 2004	Bactroban® top ung	67.24 ± 31.22	274 828.09
	Lamisil® 1% 15g cream	136.54 ± 54.90	452 237.17
	Elocon® .1% cream	173.09 ± 60.06	313 457.90
	Quadriderm® cream	253.19 ± 63.36	446 622.55
	Advantan® cream	181.18 ± 76.79	269 773.70
	Travacort® cream	237.51 ± 55.43	339 403.35
	Persivate® cream	36.28 ± 20.01	29 245.62
	Benzamycin® topical gel	359.72 ± 81.87	273 748.04
	Mylocort® cream	44.29 ± 12.36	32 683.69
	Differin® .1% gel	210.44 ± 38.06	152 145.29
	Neo-medrol® acne lotion	110.61 ± 51.09	79 200.07
	Roaccutane® 10mg capsule	341.03 ± 234.62	238 381.39
	Zineryt® 30ml lotion	167.50 ± 23.13	105 857.21
	Advantan® ung	190.52 ± 74.40	119 077.85
	Dactacort® cream	204.14 ± 54.90	121 257.24
	Dovate® cream	92.19 ± 43.03	53 471.80
	Lotriderm® cream	269.74 ± 55.73	147 549.33
	Lamisil® 30ml topical spray	207.81 ± 74.05	113. 462.37
	Ketazole® cream	77.70 ± 29.35	40 482.36
May to August 2004	Bactroban® topical ung	63.71 ± 41.22	367 533.81
	Lamisil ®1% cream	126.46 ± 62.28	473 956.58
	Elocon® .1% cream	154.95 ± 59.45	898 367.77
	Quadriderm® cream	228.38 ± 77.56	548 107.85
	Advantan® cream	156.92 ± 95.19	319 485.45
	Roaccuatane® 10mg capsule	314.43 ± 242.33	544 744.56
	Travacort® cream	216.09 ± 51.80	372 972.72
	Dalacin® T lotion	154.41 ± 38.18	164 911.57
	Differin® .1% gel	209.20 ± 44.76	211 497.72
	Zineryt ®30ml lotion	162.24 ± 37.94	159 969.06
	Persivate® cream	28.22 ± 49.75	27 626.58
	Benzamycin® topical gel	365.86 ± 72.19	321 592.88
	Mylocort® cream	40.85 ± 15.23	35 005.57
	Daktacort® cream	200.47 ± 60.39	167 595.95

Table B7: (Continue) The cost of dermatological products with a prevalence of more than 1 % during the different four monthly periods for 2004.

	Lotriderm® cream	252.86 ± 60.84	201 784.58
Month	**Trade name**	**Average cost (R)**	**Total cost (R)**
	Advantan® ung	160.35 ± 82.78	126 197.78
	Neo-medrol® acne lotion	101.01 ± 42.16	74 544.26
	Dovate® cream	71.59 ± 40.81	51 761.24
	Adco-dermed® shampoo	27.52 ± 27.20	18 879.69
September to December 2004	Bactroban® topical ung	53.34 ± 34.94	321 706.37
	Lamisil® 1% 15g cream	111.93 ± 60.16	598 809.10
	Elocon® .1% cream	132.21 ± 55.45	431 020.67
	Quadriderm® cream	189.56 ± 55.96	580 054.58
	Advantan® cream	151.13 ± 74.89	457 773.09
	Travacort® cream	178.99 ± 46.82	423 858.44
	Roaccutane® 10mg capsule	163.03 ± 114.21	306 980.05
	Differin® .1% gel	195.06 ± 45.29	276 788.24
	Lotriderm® cream	201.20 ± 54.33	239 831.30
	Advantan® ung	150.48 ± 64.34	73 055.23
	Persivate® cream	17.11 ± 13.99	19 675.89
	Dovate® cream	53.67 ± 29.23	59 467.99
	Mylocort® cream	31.60 ± 12.72	34 226.29
	Dalacin® T lotion	130.44 ± 36.14	136 575.55
	Daktacort® cream	182.11 ± 48.34	183 384.33
	Benzamycin® topical gel	320.93 ± 78.35	307 128.16
	Zineryt® 30ml lotion	143.55 ± 20.89	134 360.07
	Neo-medrol® acne lotion	90.85 ± 37.30	81 496.03
	Dovate® ung	53.07 ± 34.75	45 590.06

APPENDIX C

Table C1: The d-value of the average cost of innovator products in dermatology during the different study periods.

Month	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.05	0.05	0.17	0.09	0.07
May to August 2001	0.05		0.003	0.12	0.04	0.11
September to December 2001	0.05	0.003		0.11	0.04	0.11
January to April 2004	0.17	0.12	0.11		0.08	0.23
May to August 2004	0.09	0.04	0.04	0.08		0.15
September to December 2004	0.07	0.11	0.11	0.23	0.15	

Table C2: Therapeutic categories and number of generics products used during the different study periods.

Month	Therapeutic category	Number of generics prescribed	% Of generic products prescribed *
January to April 2001	Antibacterial	535	1.04
	Antifungal	1 776	3.46
	Corticostriods	4 004	7.81
	Anti-acne	304	0.59
May to August 2001	Antibacterial	142	0.31
	Antifungal	1 745	3.75
	Corticosteroids	3 651	7.86
	Anti-acne	374	0.80
September to December 2001	Antibacterial	529	1.23
	Antifungal	1 652	3.84
	Corticosteroids	3 823	8.90
	Anti-acne	282	0.66
January to April 2004	Antibacterial	809	1.56
	Anti-fungal	2 381	4.59
	Cortiosteroids	5 139	9.92
	Anti-acne	284	0.55
May to August 2004	Antibacterial	984	1.40
	Anti-ungal	3 345	4.94
	Corticosteroids	5 854	8.65
	Anti-acne	378	0.56
September to December 2004	Antibacterial	1 156	1.44
	Antifungal	3 245	4.03
	Corticosteroids	7 874	9.79
	Anti-acne	585	0.73

*The % of the generics was calculated from the total of each pharmacological product for example the number of anti-bacterial generics divided by the total number of anti-bacterial products.

Table C3: Therapeutic categories and the number of innovator products used during the different study period.

Month	Therapeutic categories	Number of innovator products prescribed	% of innovator products *
January to April 2001	Antibacterial	6 809	13.28
	Antifungal	7 413	14.46
	Corticosteroids	19 016	37.09
	Anti-acne	7 591	14.81
May to August 2001	Antibacterial	6 008	12.9
	Antifungal	6 101	13.10
	Corticosteroids	17 723	38.15
	Anti-acne	1 680	3.62
September to December 2001	Antibacterial	5 306	12.35
	Anti-ungal	5 739	13.36
	Corticosteroids	16 285	37.90
	Anti-acne	5 469	12.73
January to April 2004	Antibacterial	6 366	12.28
	Antifungal	7 708	14.87
	Corticosteroids	15 544	29.99
	Anti-acne	7 328	14.14
May to August 2004	Antibacterial	8 314	12.28
	Antifungal	8 986	13.28
	Corticosteroids	21 069	31.13
	Anti-acne	10 373	15.32
September to December 2004	Antibacterial	8 537	10.61
	Antifungal	11 687	14.53
	Corticosteroids	26 615	33.08
	Anti-acne	11 437	14.21

*The % was calculated as follow: the number of innovators divided by the total number of the products for each pharmacological product. For example the total number of antibacterial innovator products divided by the total number of antibacterial products.

APPENDIX D

Table 1D: The different potencies of the corticosteroids (Cheigh, 2005:1775).

Potency	Corticosteroids	Strengths (%)
Very high	Betamethasone dipropionate cream AF, ointment, gel, lotion	0.05
	Clobetasol propionate cream, ointment, solution, foam	0.05
	Diflorasone diacetate ointment	0.05
	Halobetasol propionate cream, ointment	0.05
High	Amcinonide ointment, lotion, cream	0.1
	Betamethasone dipropionate cream, lotion, ointment	0.05
	Betamethasone dipropionate topical aerosol	0.1
	Desoximetasone cream, ointment	
	Desoximetasone gel	0.25
	Diflorasone diacetate cream, ointment	0.05
	Fluocinolone acetonide cream	0.05
	Fluocinonide gel, cream, ointment, solution	
	Halcinonide cream, ointment, solution	0.2
	Triamcinolone acetonide cream (Kenalog), ointment (Aristocort, Kenalog)	0.05
	Triamcinolone acetonide cream, ointment	0.025 (cream), 0.1(cream and ointment, solution)
		0.1
		0.5

Table 1D: (Continue) The different potencies of the corticosteroids (Cheigh, 2005:1775).

Medium	Beclomethasone dipropionate cream, lotion, ointment	0.025
	Betamethasone benzoate cream, gel, ointment	0.025
	Betamethasone valerate ointment, lotion	
	Betamethasone valerate cream	0.05, 0.1
	Betamethasone valerate foam	
	Clobetasol butyrate cream, ointment	0.01, 0.05, 0.1
	Desoximetasone cream	0.12
	Desoximetasone cream, ointment	0.05
	Desoximetasone gel	0.05
	Diflucortolone valerate cream, ointment	0.25
	Fluocinolone acetonide cream, solution	0.05
	Fluocinolone acetonide cream, ointment	0.1
	Flurandrenolide ointment, cream, lotion	
	Flurandrenolide tape	0.01
	Fluticasone propionate cream, ointment	
	Hydrocortosone butyrate cream, ointment	0.025
	Hydrocortosone valerate cream, ointment	
	Mometasone furoate cream, lotion, ointment	0.05
	Triamcinolone acetonide ointment, cream, lotion	4mcg/cm^2
	Triamcinolone acetonide topical aerosol	0.05
	Triamcinolone acetonide cream, lotion, ointment	0.1
	Triamcinolone acetonide cream (Aristocort)	0.2
		0.1
		0.1
		0.015
		0.025
		0.1
Low	Alclometasone dipropionate cream, ointment	0.05
	Clocortolone pivalate cream	
	Desonide cream, lotion, ointment	0.1
	Dexametasone gel, topical aerosol	0.05
	Dexametasone topical aerosol	0.01
	Dexametasone sodium phosphate cream	0.04
	Flumethasone pivalate cream, ointment	0.1
	Flurandrenolide cream, ointment	
	Hydrocortisone cream, lotion, ointment	0.03
	Hydrocortisone acetate cream, lotion, ointment	
	Methylprednisolone acetate cream, ointment	0.0125
	Methylprednisolone acetate ointment	All strengths
		All strengths
		0.25
		1

Table 2D: The prevalence and the cost of the products containing mupurocin during January to December for 2001 and 2004.

	Jan –Apr 2001	May – Aug 2001	Sept –Dec 2001	Jan –Apr 2004	May Aug 2004	Sept –Dec 2004
Prevalence	4 861	4 028	3 802	4 087	5 769	6 031
Prevalence % *	9.48 (N = 51 273)	8.67 (N = 46 461)	8.85 (N = 42 967)	7.89 (N =51 826)	8.52 (N = 67 689)	7.50 (N = 80 461)
Prevalence % **	66.19 (N = 7 344)	65.5 (N = 6 150)	65.16 (N = 5 835)	56.96 (N = 7 175)	62.29 (N = 9 262)	62.33 (N = 9 676)
Cost (R)	235 602.84	191 496.74	192 401.95	274 828.09	367 533.81	321 706.37
Cost % #	3.53 (N = 6 665 728.40)	3.00 (N = 6 375 332.90)	3.28 (N = 5 872 828.62)	3.45 (N = 7 963 259.14)	3.82 (N = 9 631 055.06)	3.41 (N = 9 431 226.28)
Cost % ##	60.98 (N = 386 379.19)	59.35 (N = 322 680.36)	61.68 (N = 311 917.32)	60.14 (N = 457 009.62)	63.71 (N = 576 904.20)	62.61 (N = 513 819.84)
Cost-prevalence index	0.92	0.91	0.95	1.06	1.02	1.00
Trade name(s)	Bactroban® topical ointment	Bactroban® topical ointment	Bactroban® topical ointment	Bactroban® topical ointment	Bactroban® topical ointment	Bactroban® topical ointment

*The percentage prevalence is calculated from the total number of dermatological products in dermatology in each separate period.

#Percentage of the cost is calculated from the total cost of dermatological products for each separate period.

**The % of the prevalence was calculated form the number of active ingredients for the time period divided by the total number of dermatological products in the time period x 100

##The % of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

Table 3D: D-value between the average cost of mupurocin during the different study periods of 2001 and 2004.

Month	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.05	0.09	0.60	0.37	0.14
May to August 2001	0.05		0.13	0.63	0.39	0.17
September to December 2001	0.09	0.13		0.53	0.32	0.08
January to April 2004	0.06	0.63	0.53		0.09	0.40
May to August 2004	0.37	0.39	0.32	0.09		0.25
September to December 2004	0.14	0.17	0.08	0.40	0.25	

Table 4D: The prevalence and the cost of terbinafine HCl during the different study periods of 2001 and 2004.

	Jan –Apr 2001	**May – Aug 2001**	**Sept –Dec 2001**	**Jan –Apr 2004**	**May Aug 2004**	**Sept –Dec 2004**
Prevalence	2 976	2 389	2 801	4 039	4 803	6 895
Prevalence % *	5.80 (N = 51 273)	5.14 (N = 42 461)	6.52 (N = 42 967)	7.79 (N = 51 826)	7.10 (N = 67 689)	8.57 (N = 80 461)
**	32.39 (N = 9 189)	30.45 (N = 7 846)	37.90 (N = 7 391)	40.15 (N = 10 059)	38.95 (N = 12 331)	46.18 (N = 14 932)
Cost (R)	351 273.44	281 278.24	343 669.08	597 463.59	675 270	819 651.90
Cost % #	5.27 (N = 6 665 728.40)	4.41 (N = 6 375 332.90)	5.85 (N = 5 872 828.62)	7.50 (N = 7 963 259.14)	7.01 (N = 9 631 055.06)	8.69 (N = 9 431 226.28)
##	34.73 (N = 1 011 533.25)	33.16 (N = 848 134.90)	41.97 (N = 818 859.65)	48.84 (N = 1 223 351.90)	51.43 (N = 1 312 915.79)	56.73 (N = 1 444 917.39)
Cost-prevalence index	1.07	1.09	1.11	1.22	1.32	1.23
Trade name(s)	Lamisil ®	Lamisil ®	Lamisil ®	Lamisil ®	Lamisil ®	Lamisil ®

*The percentage of the prevalence of the terbinafine HCl was calculated from the number of terbinafine HCl products divided by the total of the antifungal products multiplied by a hundred for each period.

#The percentage of the cost was calculated for the total cost of the products containing active ingredient for a time period divided by the total cost of the anti-fungal products for each period x 100

**The percentage of the prevalence was calculated from the number of products containing active ingredient for the time period divided by the total number of dermatological products in the time period x 100

#The percentage of the cost was calculated for the total cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

Table 5D: The d-value between the average costs of terbinafine HCl during the different study periods.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.01	0.11	0.47	0.11	0.01
May to August 2001	0.01		0.12	0.48	0.11	0.02
September to December 2001	0.11	0.12		0.40	0.09	0.06
January to April 2004	0.47	0.48	0.40		0.04	0.46
May to August 2004	0.11	0.11	0.09	0.04		0.11
September to December 2004	0.01	0.02	0.06	0.46	0.11	

Table 6D: The prevalence of products containing ketoconazole during the different study periods.

	Jan –Apr 2001	May – Aug 2001	Sept –Dec 2001	Jan –Apr 2004	May Aug 2004	Sept –Dec 2004
Prevalence	1 339	1 171	693	1 173	1 870	2 079
Prevalence % *	2.61 (N = 51 273)	2.52 (N = 42 461)	1.61 (N = 42 967)	2.26 (N = 51 826)	2.76 (N = 67 689)	2.58 (N = 80 461)
**	14.57 (N = 9 189)	14.92 (N = 7 846)	9.38 (N = 7 391)	11.66 (N = 10 059)	15.17 (N = 12 331)	13.92 (N = 14 932)
Cost (R)	141 942.13	125 544.59	62 514.69	92 541.76	125 984.98	96 872.46
Cost % #	2.13 (N = 6 665 728.40	1.97 (N = 6 375 332.90	1.06 (N = 5 872 828.621	1.16 (N = 7 963 259.14)	1.31 (N = 9 631 055.06)	1.03 (N = 9 431 226.28)
##	14.03 (N = 1 011 533.25)	14.80 (N = 848 134.90)	7.63 (N = 818 859.65)	7.56 (N= 1 223 351.90)	9.60 (N = 1 312 915.79)	6.70 (N = 1 444 917.39)
Cost-prevalence index	0.96	0.99	0.81	0.65	0.63	0.48
Trade name(s)	NizShampoo® NizCreame® Adco-dermed shampoo® Ketzshampoo® Ketazole®	NizShampoo® NizCreame® Adco-dermed shampoo® Ketzshampoo® Ketazole®	NizShampoo® NizCreame® Adco-dermed shampoo® Ketzshampoo® Ketazole®	NizShampoo® NizCreame® Adco-dermed shampoo® Ketzshampoo® Ketazole®	NizShampoo® NizCreame® Adco-dermed shampoo® Ketzshampoo® Ketazole®	NizShampoo® NizCreame® Adco-dermed shampoo® Ketzshampoo® Ketazole®

*The percentage of the prevalence was calculated from the number of products containing the active ingredient for the time period divided by the total number of dermatological products in the time period x 100.

#The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The percentage of the prevalence of the ketoconazole was calculated from the number of products containing ketoconazole divided by total of antifungal products, multiplied by hundred for each period.

##The percentage of the cost was calculated for the total cost of the active ingredient for a time period divided by the total cost of the anti-fungal products for each period x 100.

Table 7D: D-value between the average cost of ketoconazole containing products duirng the different study periods of 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.04	0.09	0.45	0.52	**1.57**
May to August 2001	0.04		0.12	0.47	0.54	**1.67**
September to December 2001	0.09	0.12		0.39	0.46	**1.12**
January to April 2004	0.45	0.47	0.39		0.12	0.46
May to August 2004	0.52	0.54	0.46	0.12		0.27
September to December 2004	**1.57**	**1.67**	**1.12**	0.43	0.27	

Table 8D: The prevalence and the cost of betamethasone in combination with gentamycin.

	Jan –Apr 2001	May – Aug 2001	Sept –Dec 2001	Jan –Apr 2004	May Aug 2004	Sept –Dec 2004
Prevalence	3 115	2 686	2 433	2 136	2 877	3 643
Prevalence % *	6.08 (N = 51 273)	5.78 (N = 42 461)	5.66 (N = 42 967)	4.12 (N = 51 826)	4.25 (N = 67 689)	4.53 (N = 80 461)
**	13.51 (N = 23 049)	12.57 (N = 21 374)	12.10 (N = 20 108)	10.33 (N = 20 683)	10.69 (N = 26 923)	10.56 (N = 34 489)
Cost (R)	661 890.48	576 345.39	517 867.72	527 199.68	650 127.72	690 563.67
Cost % #	9.93 (N = 6 665 728.40)	9.04 (N = 6 375 332.90)	8.82 (N = 5 872 828.62)	6.62 (N = 7 963 259.14)	6.75 (N = 9 631 055.06)	7.32 (N = 9 431 226.28)
##	19.88 (N = 3 329 167.64)	18.22 (N = 3 162 867.60)	17.44 (N = 2 968 666.64)	16.49 (N = 3 197 966.09)	17.31 (N = 3 755.758.07)	16.60 (N = 4 160 712.57)
Cost-prevalence index	1.47	1.45	1.44	1.60	1.62	1.57
Trade name(s)	Quadriderm® Diprogenta® Celestoderm &gara Cream®	Quadriderm® Diprogenta® Celestoderm &gara Cream®	Quadriderm® Diprogenta® Celestoderm &gara Cream®	Quadriderm® Diprogenta® Celestoderm &gara Cream®	Quadriderm® Diprogenta® Celestoderm &gara Cream®	Quadriderm® Diprogenta® Celestoderm &gara Cream®

*The prevalence percentage was calculated from the number of active ingredient for the time period divided by the total number of dermatological products in the time period x 100

##The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The prevalence percentage of this active ingredient was calculated from the number of betamethasone in combination with gentamycin divided by the total number of corticosteroids for each period, multiplied by hundred.

##The cost percentage of the active ingredient was calculated for the number of betamethasone in combination with gentamycin divided by the total cost of corticosteroids for each time period, multiplied by hundred.

Table 9D: D-value between the average cost of betamethasone in combination with gentamycin containing products over different study periods of 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.05	0.01	0.53	0.17	0.38
May to August 2001	0.05		0.04	0.49	0.15	0.42
September to December 2001	0.01	0.04		0.52	0.17	0.39
January to April 2004	0.53	0.49	0.52		0.27	**0.88**
May to August 2004	0.17	0.15	0.17	0.27		0.47
September to December 2004	0.38	0.42	0.39	**0.88**	0.47	

Table 10D: The prevalence and the cost of mometasone during the different study periods of 2001 and 2004.

	Jan –Apr 2001	May – Aug 2001	Sept –Dec 2001	Jan –Apr 2004	May Aug 2004	Sept –Dec 2004
Prevalence	3 921	3 596	3 208	2 697	3 694	4 525
Prevalence % *	7.65 (N = 51 273)	7.74 (N = 42 461)	7.47 (N = 42 967)	5.20 (N = 51 826)	5.46 (N = 67 689)	5.62 (N = 80 461)
**	17.01 (N = 23 049)	16.82 (N = 21 374)	15.95 (N = 20 108)	13.04 (N = 20 683)	13.72 (N = 26 923)	13.12 (N = 34 489)
Cost (R)	691 963.84	613 326.49	535 928.64	501 716.21	602 849.81	625 502.77
Cost % #	10.38 (N = 6 665 728.40)	9.62 (N = 6 375 332.90)	9.13 (N = 5 872 828.62)	6.30 (N = 7 963 259.14)	6.26 (N = 9 631 055.06)	6.63 (N = 9 431 226.28)
##	20.78 (N = 3 329 167.64)	19.39 (N = 3 162 867.60)	16.76 (N = 2 968 666.64)	15.69 (N = 3 197 966.09)	16.05 (N = 3 755.758.07)	15.03 (N = 4 160 712.57)
Cost-prevalence index	1.22	1.15	1.05	1.20	1.17	1.15
Trade name(s)	Elocon® Elica®	Elocon® Elica®	Elocon® Elica®	Elocon® Elica®	Elocon® Elica®	Elocon® Elica®

*The prevalence percentage was calculated from the number of active ingredient for the time period divided by the total number of dermatological products in the time period x 100

##The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The prevalence percentage of this active ingredient was calculated from the number of mometasone divided by the total number of corticosteroids for each period, multiplied by hundred.

##The cost percentage of the active ingredient was calculated for the number of mometasone divided by the total cost of corticosteroids for each time period, multiplied by hundred.

Table 11D: D-value between the average cost of mometasone containing products during the different study periods of 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.06	0.10	0.10	0.14	0.42
May to August 2001	0.06		0.04	0.19	0.10	0.41
September to December 2001	0.10	0.04		0.24	0.05	0.36
January to April 2004	0.10	0.19	0.24		0.28	0.59
May to August 2004	0.14	0.10	0.05	0.28		0.33
September to December 2004	0.42	0.41	0.36	0.59	0.33	

Table 12D: The prevalence of methylprednisolone aceponate containing products during the different study periods of 2001 and 2004.

	Jan –Apr 2001	**May – Aug 2001**	**Sept –Dec 2001**	**Jan –Apr 2004**	**May Aug 2004**	**Sept –Dec 2004**
Prevalence	2 363	2 565	2 509	2 660	3 570	5 194
Prevalence % *	4.61 (N = 51 273)	5.52 (N = 42 461)	5.84 (N = 42 967)	5.13 (N = 51 826)	5.27 (N = 67 689)	6.46 (N = 80 461)
**	10.25 (N = 23 049)	12.00 (N = 21 374)	12.48 (N = 20 108)	12.86 (N = 20 683)	13.26 (N = 26 923)	15.06 (N = 34 489)
Cost (R)	325 785.87	388 812.70	396 439.65	489 130.24	561 962.50	670 140.91
Cost % #	4.89 (N = 6 665 728.40)	6.10 (N = 6 375 332.90)	4.98 (N = 5 872 828.62)	6.14 (N = 7 963 259.14)	5.83 (N = 9 631 055.06)	7.11 (N = 9 431 226.28)
##	9.79 (N = 3 329 167.64)	12.29 (N = 3 162 867.60)	12.40 (N = 2 968 666.64)	15.30 (N = 3 197 966.09)	14.96 (N = 3 755.758.07)	16.11 (N = 4 160 712.57)
Cost-prevalence index	0.96	1.02	0.99	1.19	1.13	1.07
Trade name(s)	Adaplene® Advanta®	Adaplene® Advanta®	Adaplene® Advanta®	Adaplene® Advanta®	Adaplene® Advanta®	Adaplene® Advanta®

*The prevalence percentage was calculated from the number of active ingredient for the time period divided by the total number of dermatological products in the time period x 100

##The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The prevalence percentage of this active ingredient was calculated from the number of methylprednisone acetonate divided by the total number of corticosteroids for each period, multiplied by hundred.

##The cost percentage of the active ingredient was calculated for the number of methylprednisone acetonate divided by the total cost of corticosteroids for each time period, multiplied by hundred.

Table 13D: D-value between the average cost of methylprednislone aceponate containing products over the different study periods of 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.24	0.34	0.58	0.25	0.18
May to August 2001	0.24		0.11	0.41	0.09	0.02
September to December 2001	0.34	0.11		0.33	0.02	0.11
January to April 2004	0.58	0.41	0.33		0.29	0.43
May to August 2004	0.25	0.09	0.02	0.29		0.11
September to December 2004	0.18	0.02	0.11	0.43	0.11	

Table 14D: The prevalence of betamethasone in combination with clotrimazole products during the different study periods of 2001 and 2004.

	Jan –Apr 2001	May – Aug 2001	Sept –Dec 2001	Jan –Apr 2004	May Aug 2004	Sept –Dec 2004
Prevalence	1 016	864	706	547	798	1 192
Prevalence % *	1.98 (N = 51 273)	1.86 (N = 42 461)	1.64 (N = 42 967)	1.06 (N = 51 826)	1.18 (N = 67 689)	1.48 (N = 80 461)
**	4.41 (N = 23 049)	4.04 (N = 21 374)	3.51 (N = 20 108)	2.64 (N = 20 683)	2.96 (N = 26 923)	3.46 (N = 34 489)
Cost (R)	227 369.55	196 113.92	158 885.01	147 549.33	201 784.58	239 831.30
Cost % #	3.41 (N = 6 665 728.40)	3.08 (N = 6 375 332.90)	2.00 (N = 5 872 828.62)	1.85 (N = 7 963 259.14)	2.10 (N = 9 631 055.06)	2.54 (N = 9 431 226.28)
##	6.83 (N = 3 329 167.64)	6.20 (N = 3 162 867.60)	4.97 (N = 2 968 666.64)	4.61 (N = 3 197 966.09)	5.37 (N = 3 755.758.07)	5.76 (N = 4 160 712.57)
Cost-prevalence index	1.55	1.53	1.42	1.75	1.81	1.66
Trade name(s)	Lotriderm®	Lotriderm®	Lotriderm®	Lotriderm®	Lotriderm®	Lotriderm®

*The prevalence percentage was calculated from the number of active ingredient for the time period divided by the total number of dermatological products in the time period x 100

##The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The prevalence percentage of this active ingredient was calculated from the number of betamethasone in combination with clotrimazole divided by the total number of corticosteroids for each period, multiplied by hundred.

##The cost percentage of the active ingredient was calculated for the number of betamethasone in combination with clotrimazole divided by the total cost of corticosteroids for each time period, multiplied by hundred.

Table 15D: D-value between the average cost of betamethasone in combination with clotrimazole containing products during the different study periods of 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.07	0.03	**0.82**	0.48	0.42
May to August 2001	0.07		0.04	0.77	0.43	0.47
September to December 2001	0.03	0.04		**0.80**	0.46	0.44
January to April 2004	**0.82**	0.77	**0.80**		0.28	**1.23**
May to August 2004	0.48	0.43	0.46	0.28		**0.85**
September to December 2004	0.42	0.47	0.44	**1.23**	**0.85**	

Table 16D: The prevalence of isoconazole in combination with diflucotolone valerate containing products during the different study periods of 2001 and 2004.

	Jan –Apr 2001	May – Aug 2001	Sept –Dec 2001	Jan –Apr 2004	May Aug 2004	Sept –Dec 2004
Prevalence	2 238	2 029	1 955	1 429	1 726	2 368
Prevalence % *	4.36 (N = 51 273)	4.37 (N = 42 461)	4.55 (N = 42 967)	2.76 (N = 51 826)	2.55 (N = 67 689)	2.94 (N = 80 461)
**	9.71 (N = 23 049)	9.49 (N = 21 374)	9.72 (N = 20 108)	6.91 (N = 20 683)	6.41 (N = 26 923)	6.87 (N = 34 489)
Cost (R)	354 079.23	332 309.96	383 290.52	339 403.35	372 972	423 858.44
Cost % #	5.31 (N = 6 665 728.40)	5.21 (N = 6 375 332.90)	4.81 (N = 5 872 828.62)	4.26 (N = 7 963 259.14)	3.87 (N = 9 631 055.06)	4.49 (N = 9 431 226.28)
##	10.64 (N = 3 329 167.64)	10.51 (N = 3 162 867.60)	11.99 (N = 2 968 666.64)	10.61 (N = 3 197 966.09)	9.93 (N = 3 755.758.07)	10.19 (N = 4 160 712.57)
Cost-prevalence index	1.10	1.11	1.23	1.54	1.55	1.48
Trade name(s)	Travacort®	Travacort®	Travacort®	Travacort®	Travacort®	Travacort®

*The prevalence percentage was calculated from the number of active ingredient for the time period divided by the total number of dermatological products in the time period x 100

##The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The prevalence percentage of this active ingredient was calculated from the number of isoconazole nitrate in combination with diflucortolone valerate divided by the total number of corticosteroids for each period, multiplied by hundred.

##The cost percentage of the active ingredient was calculated for the number of isoconazole nitrate in combination with diflucotolone valerate divided by the total cost of corticosteroids for each time period, multiplied by hundred.

Table 17D: D-value between the average cost of isoconazole in combination with diflucotolone valerate containing products during the different study periods 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.15	0.72	**1.43**	**1.12**	0.44
May to August 2001	0.15		0.61	**1.43**	**1.01**	0.32
September to December 2001	0.72	0.61		0.75	0.38	0.32
January to April 2004	**1.43**	**1.43**	0.75		0.39	**1.06**
May to August 2004	**1.12**	**1.01**	0.38	0.39		0.70
September to December 2004	0.44	0.32	0.32	**1.06**	0.70	

Table 18D: The prevalence of isotretinoin containing products during the different study periods of 2001 and 2004.

	Jan –Apr 2001	May – Aug 2001	Sept –Dec 2001	Jan –Apr 2004	May Aug 2004	Sept –Dec 2004
Prevalence	510	622	551	1 689	3 097	3 328
Prevalence % *	0.99 (N = 51 273)	1.34 (N = 42 461)	1.28 (N = 42 967)	3.26 (N = 51 826)	4.58 (N = 67 689)	4.14 (N = 80 461)
**	6.46 (N = 7 895)	8.40 (N = 7 404)	9.58 (N = 5 751)	22.19 (N = 7 612)	28.80 (N = 10 752)	27.68 (N = 12 022)
Cost (R)	435 685.55	621 457.18	521 903.70	612 192.21	1 004 783.24	740 462.97
Cost % #	6.54 (N = 6 665 728.40)	9.75 (N = 6 375 332.90)	6.55 (N = 5 872 828.62)	7.69 (N = 7 963 259.14)	10.43 (N = 9 631 055.06)	7.85 (N = 9 431 226.28)
##	30.98 (N = 1 406 308.87)	40.72 (N = 1 526 221.77)	42.54 (N = 1 226 907.99)	33.67 (N = 1 818 024.84)	39.22 (N = 2 561 910.13)	34.01 (N = 2 177 304.27)
Cost-prevalence index	4.80	4.85	4.44	1.52	1.36	1.23
Trade name(s)	Roaccutane® Isotrex® Acnetane®	Roaccutane® Isotrex® Acnetane®	Roaccutane® Isotrex® Acnetane®	Roaccutane® Isotrex® Acnetane®	Roaccutane® Isotrex® Acnetane®	Roaccutane® Isotrex® Acnetane®

*The prevalence percentage was calculated from the number of active ingredient for the time period divided by the total number of dermatological products in the time period x 100

##The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The prevalence percentage of this active ingredient was calculated from the number of isotretinoin divided by the total number of corticosteroids for each period, multiplied by hundred.

##The cost percentage of the active ingredient was calculated for the number of isotretinoin divided by the total cost of corticosteroids for each time period, multiplied by hundred.

Table 19D: D-value between the average cost of isotretinoin containing products during the different study periods of 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.21	0.14	0.47	0.63	**0.90**
May to August 2001	0.21		0.08	0.70	**0.87**	**1.15**
September to December 2001	0.14	0.08		0.60	0.77	**1.04**
January to April 2004	0.47	0.70	0.60		0.22	0.59
May to August 2004	0.63	**0.87**	0.77	0.22		0.47
September to December 2004	**0.90**	**1.15**	**1.04**	0.59	0.47	

Table 20D: The prevalence of adapalene containing products during the different study periods of 2001 and 2004.

	Jan –Apr 2001	May – Aug 2001	Sept – Dec 2001	Jan – Apr 2004	May - Aug 2004	Sept – Dec 2004
Prevalence	1 028	1 080	796	1 092	1 397	1 781
Prevalence % *	2.00 (N = 51 273)	2.32 (N = 42 461)	1.85 (N = 42 967)	2.11 (N = 51 826)	2.06 (N = 67 689)	2.21 (N = 80 461)
**	13.02 (N = 7 895)	14.59 (N = 7 404)	13.84 (N = 5 751)	14.35 (N = 7 612)	12.99 (N = 10 752)	14.81 (N = 12 022)
Cost (R)	135 861.64	145 865.98	112 924.91	231 395.12	286 720.46	336 803
Cost % #	2.04 (N = 6 665 728.40)	2.29 (N = 6 375 332.90)	1.54 (N = 5 872 828.62)	2.91 (N = 7 963 259.14)	2.98 (N = 9 631 055.06)	3.57 (N = 9 431 226.28)
##	9.66 (N = 1 406 308.87)	9.56 (N = 1 526 221.77)	9.20 (N = 1 226 907.99)	12.73 (N = 1 818 024.84)	11.19 (N = 2 561 910.13)	15.47 (N = 2 177 304.27)
Cost-prevalence index	0.74	0.66	0.66	0.89	0.86	1.04
Trade name(s)	Differin® 1%	Differin® 1%	Differin® 1%	Differin® 1%	Differin® 1%	Differin® 1%

*The prevalence percentage was calculated from the number of active ingredient for the time period divided by the total number of dermatological products in the time period x 100

##The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The prevalence percentage of this active ingredient was calculated from the number of adapalene divided by the total number of corticosteroids for each period, multiplied by hundred.

##The cost percentage of the active ingredient was calculated for the number of adapalene divided by the total cost of corticosteroids for each time period, multiplied by hundred.

Table 21D: D-value between the average cost of adapalene containing products during the different study period of 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.16	0.53	**2.09**	**1.78**	**1.31**
May to August 2001	0.16		0.51	**2.02**	**1.71**	**1.24**
September to December 2001	0.53	0.51		**1.84**	**1.54**	**1.09**
January to April 2004	**2.09**	**2.02**	**1.84**		0.16	0.52
May to August 2004	**1.78**	**1.71**	**1.54**	0.16		0.37
September to December 2004	**1.31**	**1.24**	**1.09**	0.52	0.37	

Table 22D: The prevalence of benzoyl peroxide in combination with erythromycin containing products during the different study periods of 2001 and 2004.

	Jan –Apr 2001	May – Aug 2001	Sept – Dec 2001	Jan – Apr 2004	May - Aug 2004	Sept – Dec 2004
Prevalence	904	833	641	761	879	957
Prevalence % *	1.76 (N = 51 273)	1.79 (N = 42 461)	1.49 (N = 42 967)	1.47 (N = 51 826)	1.30 (N = 67 689)	1.19 (N = 80 461)
**	11.45 (N = 7 895)	11.25 (N = 7 404)	11.15 (N = 5 751)	10.00 (N = 7 612)	8.18 (N = 10 752)	7.96 (N = 12 022)
Cost (R)	162 757.32	154 933.93	127 360.47	273 748.04	321 592.88	307 128.16
Cost % #	2.44 (N = 6 665 728.40)	2.43 (N = 6 375 332.90)	1.60 (N = 5 872 828.62)	3.43 (N = 7 963 259.14)	3.34 (N = 9 631 055.06)	3.26 (N = 9 431 226.28)
##	11.57 (N = 1 406 308.87)	10.15 (N = 1 526 221.77)	10.38 (N = 1 226 907.99)	15.06 (N = 1 818 024.84)	12.55 (N = 2 561 910.13)	14.11 (N = 2 177 304.27)
Cost-prevalence index	1.01	0.90	0.93	1.51	1.53	1.77
Trade name(s)	Benzamycin ®	Benzamycin®	Benzamycin®	Benzamycin®	Benzamycin®	Benzamycin®

*The prevalence percentage was calculated from the number of active ingredient for the time period divided by the total number of dermatological products in the time period x 100

##The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The prevalence percentage of this active ingredient was calculated from the number of benzoyl peroxide in combination with erythromycin divided by the total number of corticosteroids for each period, multiplied by hundred.

##The cost percentage of the active ingredient was calculated for the number of benzoyl peroxide in combination with erythromycin divided by the total cost of corticosteroids for each time period, multiplied by hundred.

Table 23D: D-value between the average cost of benzoyl peroxide in combination with erythromycin containing products during the different study periods of 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.26	**1.24**	**2.19**	**2.57**	**1.80**
May to August 2001	0.26		0.55	**2.12**	**2.49**	**1.72**
September to December 2001	**1.24**	0.55		**1.97**	**2.32**	**1.56**
January to April 2004	**2.19**	**2.12**	**1.97**		0.07	0.47
May to August 2004	**2.57**	**2.49**	**2.32**	0.07		0.57
September to December 2004	**1.80**	**1.72**	**1.56**	0.47	0.57	

Table 24D: The prevalence of methylprednisolone in combination with neomycin containing products during the different study periods of 2001 and 2004.

	Jan –Apr 2001	**May – Aug 2001**	**Sept – Dec 2001**	**Jan – Apr 2004**	**May - Aug 2004**	**Sept – Dec 2004**
Prevalence	1 419	1 115	881	716	738	897
Prevalence % *	2.77 (N = 51 273)	2.40 (N = 42 461)	2.05 (N = 42 967)	1.38 (N = 51 826)	1.09 (N = 67 689)	1.11 (N = 80 461)
**	17.97 (N = 7 895)	15.06 (N = 7 404)	15.32 (N = 5 751)	9.41 (N = 7 612)	6.86 (N = 10 752)	7.46 (N = 12 022)
Cost (R)	140 065.35	108 319.86	87 865.01	79 200.07	74 544.26	81 496.03
Cost % #	2.10 (N = 6 665 728.40)	1.70 (N = 6 375 332.90)	1.10 (N = 5 872 828.62)	0.99 (N = 7 963 259.14)	0.77 (N = 9 631 055.06)	0.86 (N = 9 431 226.28)
##	9.96 (N = 1 406 308.87)	7.10 (N = 1 526 221.77)	7.16 (N = 1 226 907.99)	4.36 (N = 1 818 024.84)	2.91 (N = 2 561 910.13)	3.74 (N = 2 177 304.27)
Cost-prevalence index	0.55	0.47	0.47	0.46	0.42	0.50
Trade name(s)	Neo-Medrol® acne lotion	Neo-Medrol® acne lotion	Neo-Medrol® acne lotion	Neo-Medrol® acne lotion	Neo-Medrol® acne lotion	Neo-Medrol® acne lotion

*The prevalence percentage was calculated from the number of active ingredient for the time period divided by the total number of dermatological products in the time period x 100

##The percentage of the cost was calculated for the cost of the active ingredient in a time period divided by the total cost of dermatological products in that time period.

**The prevalence percentage of this active ingredient was calculated from the number of methylprednisolone in combination with neomycin divided by the total number of corticosteroids for each period, multiplied by hundred.

##The cost percentage of the active ingredient was calculated for the number of methylprednisolone in combination with neomycin divided by the total cost of corticosteroids for each time period, multiplied by hundred.

Table 25D: D-value between the average cost of methylprednisolone in combination with neomycin containing products over the different study periods of 2001 and 2004.

	January to April 2001	May to August 2001	September to December 2001	January to April 2004	May to August 2004	September to December 2004
January to April 2001		0.05	0.03	0.23	0.05	0.21
May to August 2001	0.05		0.08	0.26	0.09	0.17
September to December 2001	0.03	0.08		0.21	0.03	0.24
January to April 2004	0.23	0.26	0.21		0.19	0.39
May to August 2004	0.05	0.09	0.03	0.19		0.24
September to December 2004	0.21	0.17	0.24	0.39	0.24	

APPENDIX E

Table E 1: The prevalence and cost of dermatological products as triple therapy during 2001.

2001	Antibacterial		Antifungal		Corticosteroids		Anti-acne	
Prevalence		%		%		%		%
January to April (N = 46 114)			3	0.01	29	0.06	35	0.08
May to August (N = 41 708)			5	0.01	28	0.07	28	0.07
September to December (N = 38 625)	3	0.01	3	0.01	27	0.07	20	0.05
Total Cost (R)								
January to April (N = 6 665 728.40)			1402.42	0.02	13 123.69	0.20	17 293.61	0.26
May to August (N = 6 375 332.90)			2036.95	0.03	7 693.50	0.12	12 329.78	0.19
September to December (N = 5 872 828.62)	530.32	0.01	1307.74	0.02	11 601.55	0.20	9 067.90	0.15
Cost-prevalence index								
January to April			2		3.33		3.25	
May to August			3		1.71		2.71	
September to December	1		2		2.86		3	

Table E 2: The prevalence and cost of dermatological products as triple therapy during 2004.

2004	Antibacterial		Antifungal		Corticosteroids		Anti-acne	
Prevalence		%		%		%		%
January to April (N = 46 340)	1	0.002	8	0.02	38	0.08	100	0.22
May to August (N = 59 606)			6	0.01	41	0.07	299	0.50
September to December (N = 71 166)	6	0.01	9	0.01	52	0.07	371	0.52
Total Cost (R)								
January to April (N = 7 963 259.14)	247.35	0.003	3651.04	0.05	19 181.17	0.24	69 199.72	0.87
May to August (N = 9 631 055.06)			2 034.18	0.02	18 315.60	0.19	214 216.73	2.22
September to December (N = 9 431 226.28)	813.49	0.01	2 599.57	0.03	21 829.55	0.23	194 869.21	2.07
Cost-prevalence index								
January to April	1.50		2.50		3		3.95	
May to August			2		2.71		4.44	
September to December	1		3		3.29		3.98	

Table E 3: Prevalence and cost of dermatological products as four-combination therapy during 2001.

2001	Antibacterial		Antifungal		Corticosteroids		Anti-acne	
Prevalence		%		%		%		%
January to April (N = 46 114)								
May to August (N = 41 708)							1	0.002
September to December (N = 38 625)					2	0.01		
Total Cost (R)								
January to April (N = 6 665 728.40)								
May to August (N = 6 375 332.90)							668.50	0.01
September to December (N = 5 872 828.62)					996.13	0.02		
Cost-prevalence index								
January to April								
May to August							5	
September to December					2			

Table E 4: Prevalence and cost of dermatological products as four-combination therapy during 2004.

2004	Antibacterial		Antifungal		Corticosteroids		Anti-acne	
Prevalence		%		%		%		%
January to April (N = 46 340)							3	0.01
May to August (N = 59 606)	5	0.01			23	0.04	40	0.07
September to December (N = 71 166)	9	0.01	12	0.02	70	0.10	54	0.08
Total Cost (R)								
January to April (N = 7 963 259.14)							3 174.32	0.04
May to August (N = 9 631 055.06)	1 003.94	0.01			10 720.14	0.11	25 990.05 (0.27)	
September to December (N = 9 431 226.28)	1 740.12	0.02	5 805.36	0.06	28 146.71	0.30	31 451.37	0.33
Cost-prevalence index								
January to April							4	
May to August	1				2.75		3.86	
September to December	2		3		3		4.13	

Table E 5: The prevalence and cost of dermatological products with six and eight combination therapy respectively during 2004.

2004	Antibacterial		Antifungal		Corticosteroids		Anti-acne	
Prevalence		%		%		%		%
May to August (N = 59 606) Six products							7	0.01
September to December (N = 71 166) Six products					2	0.003	5	0.01
September to December (N = 71 166) Eight products							1	0.001
Total Cost (R)								
May to August (N = 9 631 055.06) Six products							7 873.08	0.08
September to December (N = 9 431 226.28) Six products					984.82	0.01	5 881.54	0.06
September to December (N = 9 431 226.28) Eight products							959.90	0.01
Cost-prevalence index								
May to August (N = 59 606) Six products							8	
September to December (N =					3.33		6	

Table E 5: (Continue) The prevalence and cost of dermatological products with six and eight combination therapy respectively during 2004.

71 166) Six products				
September to December (N = 71 166) Eight products				10

APPENDIX F

Poster presented at the 26th annual conference of the South African Academy of Pharmaceutical Sciences

29th September to 2nd October 2005

Port Elizabeth

The usage of dermatological agents: A retrospective drug utilisation review

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Introduction

A large number of people all over the world suffer from skin conditions. According to Greene *et al.* (2003:671) dermatological problems comprise about 10% of a general practitioner's caseload and probably more for pharmacists. Jobanputra and Bachmann (2000:826) also emphasise that skin diseases are becoming a significant problem in the developing world. There is a need to establish an effective method to achieve good health and quality of life for patients with skin problems (Jessop *et al.*, 2002:568). Dehkharghani *et al.* (2003:592) mentioned that the impact of skin diseases in the USA is a great burden to the nation in terms of morbidity and expenses incurred. The rising cost of health care is a worldwide problem that needs to be controlled (Dehkharghani *et al.*, 2003:592).

Aim

The aim of this study was to analyse the usage patterns and cost associated with dermatological products in the private health care sector in South Africa, by using a medicine claims database. The cost of innovator and generic products was also compared.

Method

A quantitative retrospective drug utilisation research design was used to evaluate the usage patterns and costs associated with dermatological products for 2001 and 2004. The time periods 2001 and 2004 were chosen due to the change in the pricing system of medication in South Africa, as 2001 was before the new pricing regulations came into effect and 2004 just after the implementation thereof. The data for the two years (1 January until 31 December 2001 and 1 January until 31 December 2004) was extracted from the central database of a medicine claims database. Data was analysed by using the Statistical Analysis System, 9.1 (SAS). The cost-prevalence index was calculated as follows (Serfontein, 1989:180):

Cost-prevalence index = Cost % / Prevalence %

For the purpose of this study, the cost-prevalence values were interpreted as follows (Serfontein, 1989:180):

- Cost index < 1: Consumed treatment is relatively inexpensive.
- Cost index = 1: The cost of treatment is symmetric to the prevalence.
- Cost index > 1: Consumed treatment is relatively expensive.

The classification system of MIMS was used to categorise the dermatological products. The dermatological groups for this study were the antibacterial, antifungal, corticosteroids and anti-acne products. The remainder of the dermatological products were placed under the "other" group.

Results

It was found that 8.6% (n = 126 447) of all analysed prescriptions (N = 1 475 380) issued during 2001 and 6.8% (n = 177 122) of all analysed prescriptions (N = 2 595 254) issued during 2004, contained dermatological products.

Table 1: The prevalence and total cost of dermatological products during 2001 and 2004.

	Prevalence		**Total cost**	
	n	**%**	**(R)**	**%**
2001	140 701	4.8 (N = 2 951 326)	18 913 889.92	4.9 (N = 379 708 489)
2004	199 976	3.8 (N = 5 305 882)	27 025 540.48	4.1 (N = 661 223 146)

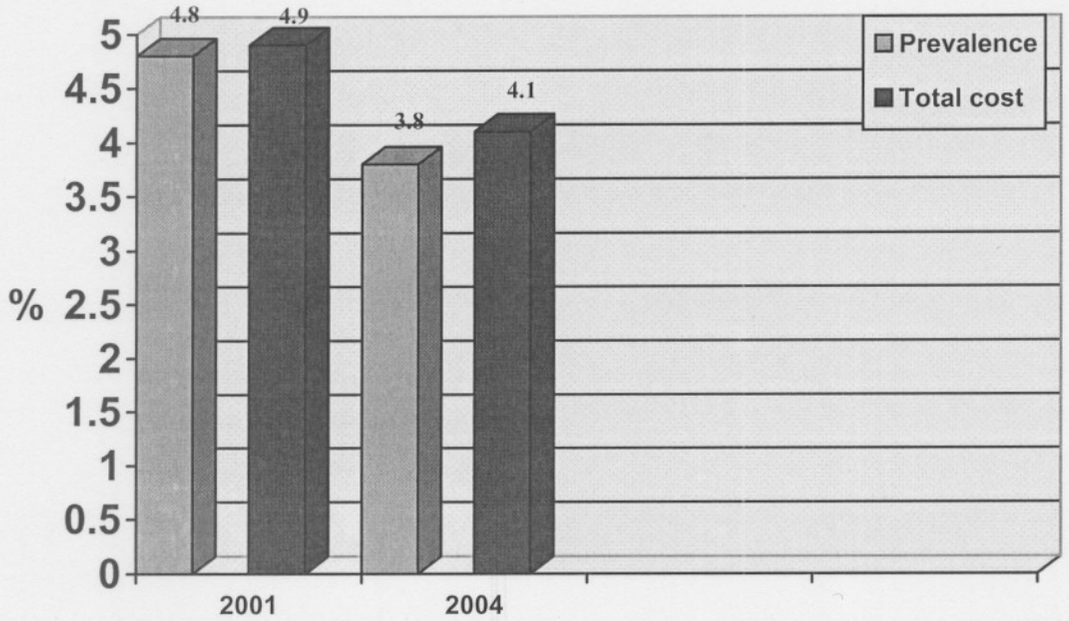

Figure 1: Total number of products and cost of dermatological products claimed during 2001 and 2004.

The dermatological products constituted 4.8% (n = 140 701) of the total number of products prescribed (N = 2 951 326) during 2001 and 3.8% (n = 199 976) of the total number of items prescribed during 2004 (N = 5 305 882). (See figure 1). The total cost of the dermatological products amounted to R18 913 889.92, thus constituting 4.9% of the total cost (R379 708 489) of all medicine products during 2001. During 2004 the total cost of dermatological products amounted to R27 025 540.48, thus constituting 4.1% of the total cost (R661 223 146) of all medicine products on the database. (See figure 2). The cost-prevalence index for 2001 and 2004 showed that the dermatological products were relatively expensive with values of 1.03 and 1.09 respectively. (See figure 1).

Table 2: The total cost and prevalence of the dermatological groups during 2001.

Dermatological group	Prevalence		Total cost		
	N	% (N = 140 701)	(R)	% (N = 18 913 889.92)	Cost-prevalence index
Antibacterial products	19329	13.7	1 020 976.87	5.4	0.4
Antifungal products	24426	17.4	2 678 527.80	14.2	0.8
Anti-acne products	21050	15.0	4 159 438.63	22.0	1.5
Corticosteroids	64531	45.9	9 460 701.88	50.0	1.1
Others	11365	8.1	1 594 244.31	8.4	1.0

Table 3: The total cost of the dermatological groups during 2004.

Dermatological group	Prevalence		Total cost		
	N	% (N = 199976)	(R)	% (N = 27 025 540.48)	Cost-prevalence index
Antibacterial products	26113	13.1	1 457 733.66	5.7	0.4
Antifungal products	37322	18.7	3 981 185.08	14.7	0.8
Anti-acne products	30386	15.2	6 557 239.24	24.3	1.6
Corticosteroids	82095	41.1	11 114 436.73	41.1	1.0
Others	24060	12.0	3 824 945.77	14.2	1.2

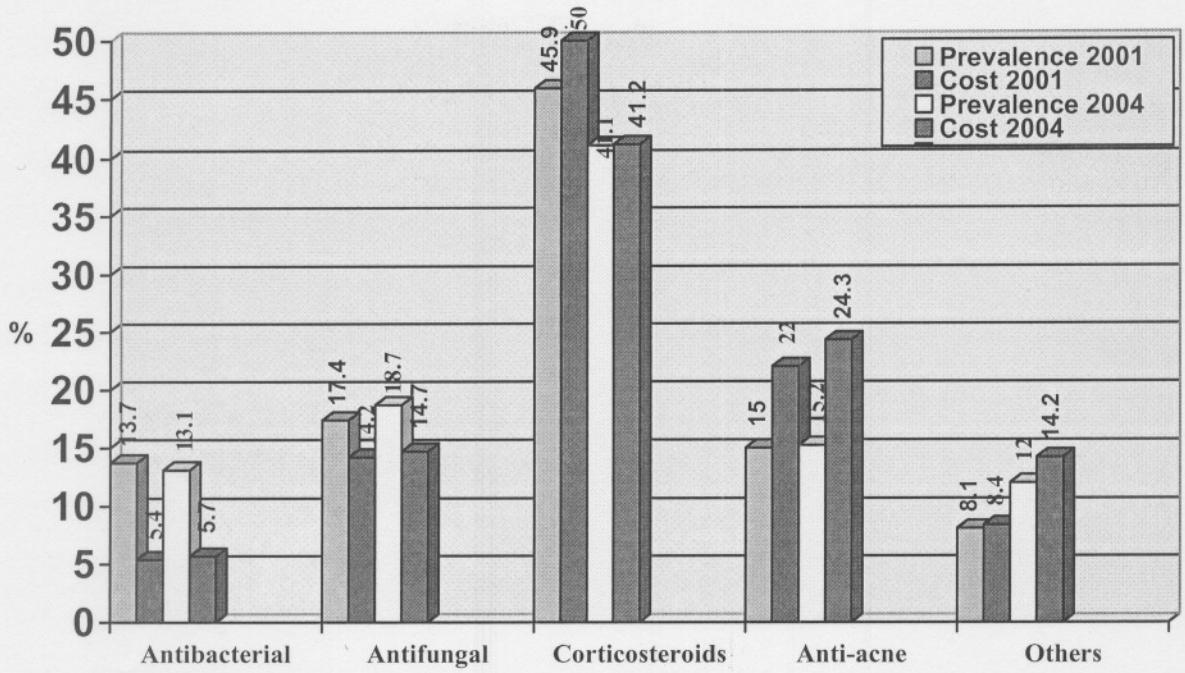

Figure 2: The prevalence and total cost of different dermatological groups during 2001 and 2004.

The antibacterial, antifungal, corticosteroids and anti-acne products represented 92% and 88.1% of the prevalence of all dermatological products during 2001 and 2004 respectively. These dermatological groups represented 91.6% and 85.8% respectively of the total cost of dermatological products during 2001 and 2004 respectively. The decrease in the cost can be due to the fact that the prevalence of generics increased during 2004. (See figure 3). The cost-prevalence index of anti-acne products and corticosteroids was more than one for both study periods, which indicate that it was relatively expensive.

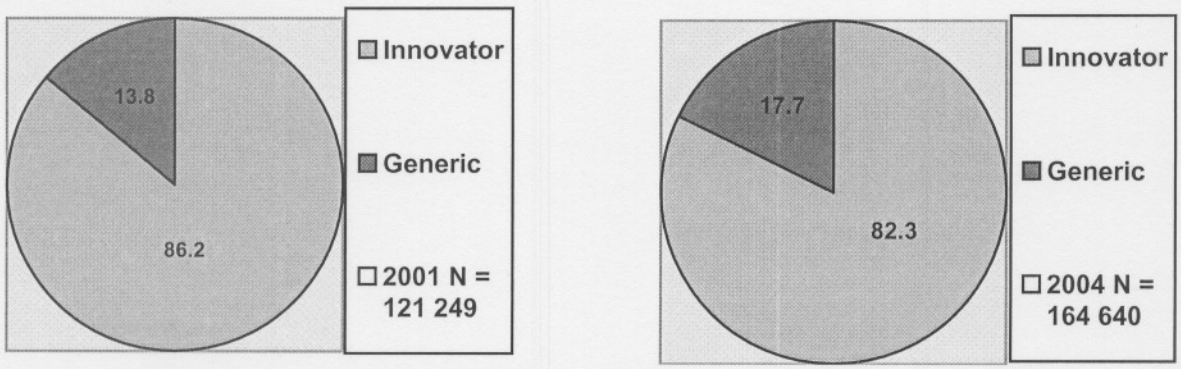

Figure 3: The prevalence of innovator and generic dermatological products during 2001 and 2004.

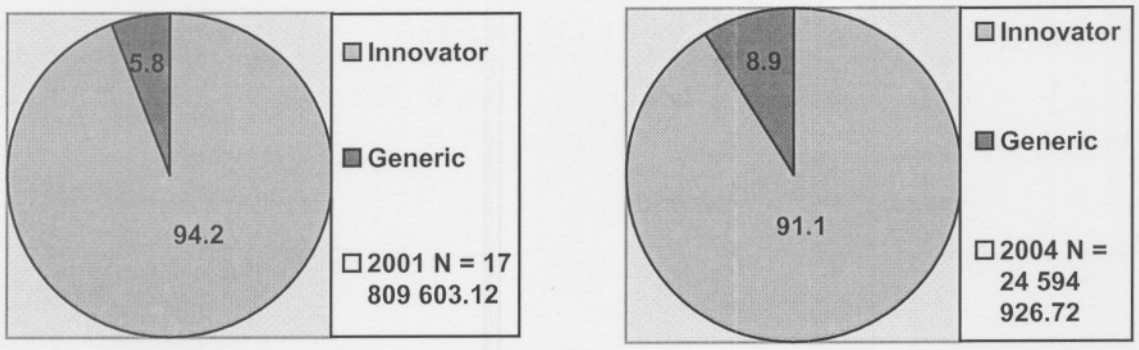

Figure 4: Total cost for both innovator and generic dermatological products during 2001 and 2004.

It was further found that the majority of dermatological products prescribed during the research periods were innovator products. The prevalence of innovator products for 2001 was 86.3% (n = 121 249) with a total cost of R17 809 603.12 (94.2%). For 2004 the prevalence was 82.3% (n = 164 640) with a total cost R24 594 923.72 (91.1%) of all the dermatological products prescribed. The use of both innovator and generic equivalents for these items is shown in figure 4. The number of innovator and generic products claimed during 2001 was respectively 73.2% (n = 2 161 451) and 26.8% of the total number of products claimed (N = 2 951 326). During 2004 the number of innovator and generic products represented respectively 66.5% (n = 3 529 046) and 33.5% (n = 1 776 836) of the total number of products claimed (N = 5 305 882).

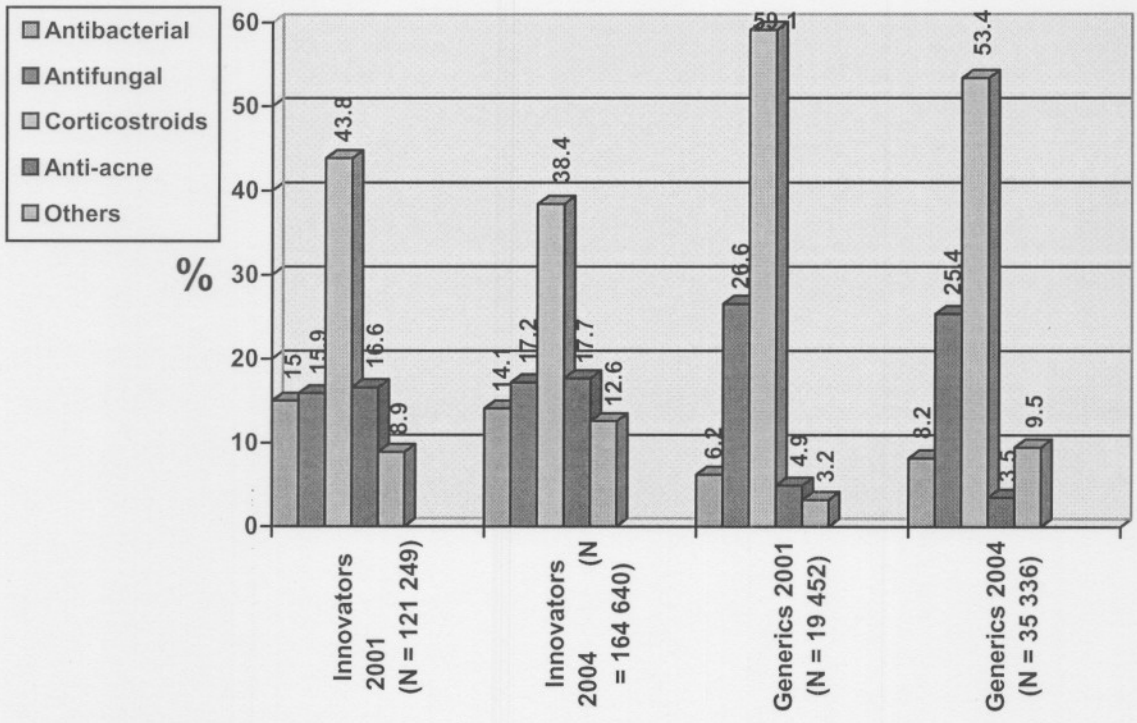

Figure 5: The prevalence of the innovator and generic products for 2001 and 2004.

The prevalence in the use of the dermatological products during 2004 increased with 35.6% from January to April versus September to December. The cost-prevalence index indicated that the dermatological products were relatively expensive during January to August. During September to December the cost-prevalence decreased and indicated that dermatological products were relative inexpensive. (See table 4).

Table 4: The prevalence and the cost of the dermatological products during 2004 in four monthly intervals.

Monthly intervals	Prevalence		Total cost		Cost-prevalence index
2004	N	% (N = 199976)	(R)	% (N = 27 025 540.48)	
January to April	51 826	25.9	7963259.14	29.5	1.1
May to August	67 689	33.8	9631055.06	35.6	1.1
September to December	80 461	40.2	9431226.28	34.9	0.9

The average cost of dermatological products during the 2004 study period showed that the cost decreased. January to April (before implementation of the new single exit price structure) was compared to September to December (after implementation of the new single exit price structure) where the average cost decreased by 22.9 %. This is slightly higher than the so-called "19 % average saving" claimed by the authorities.

Table 5: The average cost of the dermatological products in the 2004 study periods.

Monthly intervals	Average cost per product (R)
January to April	171.84 ± 201.35
May to August	161.58 ± 198.36
September to December	132.52 ± 135.07

Conclusion

It was found that both the total number of products and the total cost of dermatological products declined from 2001 to 2004. The prevalence of dermatological groups, corticosteroids, antifungal, antibacterial and anti-acne products decreased with 3.1% in prevalence and the total cost with 5.1% from 2001 to 2004. From 2001 to 2004 the innovator products decreased by 4% in prevalence and 3.1 % in total cost of dermatological products. The cost-prevalence index of the anti-acne products represented 1.5 and 1.6 from 2001 to 2004 respectively. This indicated that anti-acne products was relatively expensive products. The corticosteroids were also expensive products according to the cost-prevalence index represented by 1.1 and 1.0, which indicate that it was relatively expensive.

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