A PILOT STUDY TO ASSESS THE KNOWLEDGE OF REGISTERED NURSES REGARDING DRUG PRESCRIBING AND DISPENSING, AND THEIR PRESCRIBING PRACTICES AT PRIMARY HEALTH CARE LEVEL.

A mini thesis submitted in partial fulfilment of the requirements for the Masters Degree in Public Health, University of the Western Cape, South Africa.

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Key Words : Essential Drugs Programme, Essential Drugs List, Standard Treatment Guidelines, National Drug Policy, registered nurses, prescribing practices, dispensing practices, counselling, knowledge, competence.

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Summary

Introduction : Nurses working at Primary Health Care (PHC) level are expected to prescribe and dispense drugs according to the Essential Drugs List (EDL) and the Standard Treatment Guidelines (STGs), in an effort to promote rational drug use. Post-basic training courses such as Adult Curative for PHC provides knowledge and skills needed to practise drug therapy, however, not all nurses have attended these courses. Many registered nurses are therefore not competent to participate in the strategy of Health for All through Primary Health Care. The purpose of this study is to determine whether registered nurses at PHC level are applying the concept of rational drug use in their daily work.

Aims : To assess the knowledge of registered nurses regarding drug prescribing and dispensing, and their prescribing practices at PHC level.
To determine whether are were differences in the practices in urban, peri- urban and rural areas.

Methodology : An indicator form was used to review the prescribing practices of registered nurses. Self administered questionnaires were completed by the nurses.
Study population : All registered nurses working at Primary Health Care facilities.
Sampling : The area of study was stratified into urban, peri-urban and rural. Four clinics were randomly selected from each area. A total of 100 prescriptions per clinic were selected through systematic random sampling. Purposive sampling of all registered nurses.
Data Analysis : Quantitative analysis was done using Epi - Info version 6.0 and Microsoft Excel. Means, frequencies, ranges, percentages and p-values were calculated.

Results : The average number of drugs prescribed per encounter and the percentage of prescriptions with injections were low. The percentage of drugs prescribed on the EDL and the percentage of prescriptions using generic names were also low. Interesting significant differences were noted in the prescribing practices in urban, peri-urban and rural areas.
Conclusion : Irrational prescribing and dispensing by registered nurses at PHC level is still a major problem and reflects the need for appropriate training.

CHAPTER 1

1. Introduction

Nursing practice in South Africa is governed by the Nursing Act No. 50 of 1978 and it's regulations. The keeping, supply, administering or prescribing of medicines by registered nurses are governed by Regulation No. 2418. It states that an authorized nurse may keep, supply, administer or prescribe an unscheduled medicine and any medicine or substance listed in schedule 1, 2, 3 or 4. [1] Such legislation often impacts on the practice of registered nurses at primary health care (PHC) level.

The Medicines and Related Substances Act (Act 101 of 1965) as Amendment by Act No 90 of 1997 makes provision however, for a registered nurse to acquire, keep, use and supply schedules 1 to 6 drugs.[2]

According to Regulation No. 2418, an authorized nurse must enter on the patient's file or treatment record, the diagnosis as well as the name, quantity, strength, dosage, schedule, date and time of the medicine supplied, prescribed or administered. The authorized person must also enter his/her name and category of registration in block letters as well as his/her signature.[1]

Authorization of registered nurses is described in Section 38A of the Nursing Act, 50 of 1978, which states that registered nurses who are employed by the Department of Health, Provincial Administration, or an organization rendering health services and who has been authorized by the Director General, the Director of Hospital Services of the Provincial Administration or the Medical Officer of Health of the Local Authority may keep, supply, administer or prescribe medicines in the absence of a medical practitioner or pharmacist.[3]

According to Geyer, Section 38A (Nursing Act No.50 of 1978) becomes redundant as a result of the South African Medicines and Medical Devices Regulatory Authority (SAMMDRA) Act (Act No 132 of 1998).[4] The SAMMDRA Act includes the nurse as an authorized prescriber together with the medical practitioner, dentist, veterinarian and other persons registered under the Health Professions Act of 1974. [4] This Act provides structure for prescribing and enables the nurse to deliver a health care service within legal boundaries. [4] Section 31 (14) (b) of the Act makes provision for the authorization of nurses by the South African Nursing Council (SANC), to

prescribe within their scope of practice. It is however not clear, whether nurses will automatically be authorized to prescribe after completion of a relevant course on clinical skills, pharmacology and rational prescribing practices or a post basic course, eg. psychiatry or midwifery, or whether authorization will only take place where the need arises. Whatever the decision, it is important that nurses are equipped to become competent to deliver PHC of a high quality. [4]

In 1997, the Department of Health and SANC developed guidelines for use by persons responsible for the authorization of nurses. These guidelines state, that a registered nurse may receive the necessary authorization if all the legal requirements of Section 38A of the Nursing Act, 50 of 1978 are met and if the nurse has successfully completed a course approved by the SANC, enabling the display of the following competencies :

- Primary Health Care Nursing, Clinical Nursing Science, Health Assessment, Treatment and Care.
- Knowledge and competency in :
    - pharmacology
    - the relationships of one drug with the other
    - drug - patient relationships
    - disease profile in a geographical area
    - signs and symptoms of the most prevalent conditions in the area
    - assessment skills
    - drug supply management
    - procurement, storage, supply, control and maintenance of drugs
    - drug legislation
    - prescribing
    - the ability to respond to the demands of the Essential Drugs Programme (EDP)
    - communication skills
    - knowledge of the profession's limitations, and
    - knowledge of the nurses limitations. [2]

The Department of Health has taken significant steps in the provision of health care, where drugs are supplied free of charge to patients at primary health care level. According to the National

Drug Policy (NDP) of South Africa, these drugs should appear on the Essential Drugs List (EDL) which aids cost effective drug prescribing.[5] These drugs, known as essential drugs, are medicines which are critically needed for the management of 90-95% of common and important conditions in the country. These medicines must meet with high standards of safety, quality and efficacy.[6]

To promote the concept of essential drugs and rational drug use, the NDP has identified the need for human resource development through appropriate training and the provision of scientifically valid drug information, for use by professionals and the community.[7]

It is therefore important, that all health personnel at the functional level receive appropriate theoretical and practical training, since prescribing at primary level is based on the competency of the individual rather than on their occupation. Institutional and in - service training should be offered to health professionals involved in diagnosing, prescribing and dispensing of drugs. These skills training programmes, should be designed and implemented according to identified needs of the various categories of staff and should enable them to effectively contribute to health care development.[7]

Nursing curricula have previously placed emphasis on curative hospital care. The nursing activities involved caring for the sick, infirm and injured, and the administration of the drugs prescribed by a medical practitioner.

Since the restructuring of the National Health System, there has been a shift from curative hospital care to PHC. Nurses working in PHC settings are expected to adapt to the changes and meet the challenges effected through this process.

Among these challenges are the introduction of the EDP, the EDL and the Standard Treatment Guidelines (STGs). The first publication of STGs and the EDL for Primary Care, was released in March 1996. This edition was revised and the second edition was made available in 1998. [8] Nurses are expected to prescribe and dispense drugs according to this EDL and STGs and thereby promote rational drug use.

Post-basic training courses, such as Primary Paediatrics and Adult Curative for PHC, provides knowledge and skills to practise drug therapy, however, not all nurses have attended these courses. This means that although the Nursing Act and Regulations allow registered nurses to keep, supply administer, and prescribe medicines, many registered nurses are not competent to

participate in the strategy of Health for All through Primary Health Care. This goal, "Health for All by the Year 2000", was agreed to by the representatives of approximately 134 nations at an International Conference held in 1978, in Alma Ata. Representatives pledged to work toward meeting people's basic needs through PHC.[9] The purpose of this study is therefore to determine whether registered nurses are coping with the challenges of the restructuring process, with specific emphasis on drug prescribing and dispensing at PHC level.

1.1 Setting

The study was conducted at the following twelve PHC service sites :

- Eight clinics, four urban and four peri-urban, within the City of Tygerberg
- Four rural clinics, within the Winelands region, under the auspices of Paarl Municipality.

Six clinics from the City of Tygerberg and 2 clinics in Paarl functioned as part of a Community Health Care Centre. The other 4 clinics offered maternal, child and women's health services, including the treatment of sexually transmitted diseases and tuberculosis.

1.2 Significance and justification of the study

According to the NDP, research should be conducted to facilitate the implementation, monitoring and evaluation of the policy and should include the following areas :

- evaluation of the impact of the NDP on the health service system and delivery of health care.
- identification of problems related to prescribing and dispensing at different levels of the health system. [7]

This research aimed to identify areas of training which needs to be included or improved. Appropriate training, based on the identified training needs, would help to reduce the financial burden caused by the irrational prescribing of drugs.

1.3 Aims of the study

The aims of the study are to :

- Assess the knowledge of registered nurses regarding drug prescribing and dispensing, and their prescribing practices at PHC level.
- Determine whether there are differences in the drug prescribing practices of registered nurses at PHC level in the urban, peri- urban and rural areas.

1.4 Objectives of the study

The objectives of the study are to :

- Determine the nursing qualifications and number of years in practice, of nurses working in PHC settings.
- Determine whether registered nurses are familiar with the NDP, EDP, EDL and STGs of South Africa.
- Determine the registered nurses' perceived needs for training in prescribing and dispensing at PHC level.
- Determine the registered nurses' perceived level of knowledge and competence in prescribing, dispensing and counselling at PHC level.
- Assess the prescribing practices of registered nurses.
- Compare prescribing trends in urban, peri- urban and rural areas.
- Determine the most suitable time for registered nurses to attend training sessions.

1.5 Research question

Are the prescribing and dispensing practices of registered nurses rational ?

1.6 Definition of terms:

1.6.1 Authorization - refers to the permission given to a registered nurse by the Director General, the Director of Hospital Services of the Provincial Administration or the Medical Officer of Health of the Local Authority, to keep, supply, administer or prescribe medicines in the absence of a medical practitioner or pharmacist.[3]

1.6.2 "Drugs" and "medicines" are used inter- changeably

1.6.3 In this study the nurses' knowledge and competency will be determined as follows :

- Good - if he/she responds positively to at least 75% of the "Good " options
- Fair - if he/she responds positively to at least 50% of the "Good " options
- Poor - if he/she responds positively to only 33.3% of the "Good " options

This applies to questions 8 and 9. (See appendix 2)

1.6.4 WHO - World Health Organization

1.6.5 Rx - Treatment

1.7 Ethical considerations

1.7.1 Permission

Permission to conduct the study was requested from the managers of the clinics as well as from the registered nurses who completed the questionnaire.

1.7.2 Process

Registered nurses who participated in the study did so voluntarily and without any conditions.

1.7.3 Confidentiality and anonymity

The identity of all participants was protected to ensure that none of the findings will be used to incriminate or jeopardize the position of any individual or the PHC system.

CHAPTER 2

2. Literature review

Efforts to improve drug use practices in developing countries are under way since the conference on the rational use of drugs was convened by the World Health Organization (WHO) , in Kenya, in 1985. As a result of the conference, The International Network for the Rational Use of Drugs (INRUD) and the WHO Action Programme on Essential Drugs took the responsibility to produce a standardized set of drug use indicators. These indicators have been used in studies, to describe the extent of the problem of inappropriate prescribing. They have also been used to identify priorities for action and to quantify the impact of interventions on prescribing. [10]

A Rational Drug Prescribing Training Course - Training Manual was produced as part of a joint programme of the Universities of Durban Westville and Cape Town.[6] This manual, based on the Guide to Good Prescribing, by the WHO Action Programme on Essential Drugs, provides a six step rational prescribing process as well as information on Standard Treatment Guidelines, stock management and dispensing.[6, 11] The six steps of rational prescribing included :

- Defining the patient's problem
- Identification of the therapeutic objective
- Verifying the suitability of your personal drug of choice
- Writing the prescription
- Information, instructions and warnings to the patient
- monitoring of treatment. [11]

According to the training manual, a prescription should reflect the name and address of the prescriber and the patient, the date of the prescription (in South Africa a prescription is only valid for one month after the date on which it was written), the age in the case of children and the elderly, name and strength of the drug, the dosage form and total amount, frequency of administration, specific instructions and warnings and the prescribers' initials and signature. [6]

In 1995 an electronic version of the British National Formulary (BNF) was launched where health workers could obtain information to support their prescribing and dispensing decisions.[12]

In South Africa, to assist in rational drug use, the second edition of the Primary Health Care Formulary was released in 1995 and is currently used by some registered nurses at community level in conjunction with the EDL. This formulary provides an EDL and guidelines for the use of specific drugs, the dosage, side effects, interaction of drugs and patient information. The formulary also provides a few emergency protocols. [13]

The activity of prescribing and dispensing of medication often involves a number of individuals including the prescriber, pharmacist, nurse, care-giver and patient. Error can occur when these individuals communicate with each other. In Boston, Massachusetts, a survey of hospital patients showed that approximately a quarter of adverse events were due to error. [14] After the benefits and risks have been weighed up, a decision should be made on whether a prescription should be written at all. The prescriber then has a professional responsibility to issue a safe and legible prescription. [14] Often what may seem clear and obvious to the presciber, is unclear to the dispenser, care-giver or patient. The most commonly reported causes of medication errors include mistaking drugs with similar names, the use of non-approved abbreviations, unclear dosage units, errors with transcribing prescriptions, confusion between dosage forms, drugs administered by the wrong route, overdose of dangerous drugs, drugs given to the wrong patient and drugs given for the wrong duration. [14]

Fourie found that approximately 70% of medicines on the market are inessential or undesirable eg. anti-diarrhoeal mixtures which contain antibiotics are found to be ineffective and often dangerous.[15] Fourie further suggests that prescriptions of cough and cold preparations which contain both suppressants and expectorants, are irrational combinations.[15] According to literature, approximately 80 % of cough and cold remedies are often ineffective and contain dangerous ingredients.[15] Antibiotics can also present problems. The abuse of antibiotics leads to the resistance of bacteria to the drug, which forces consumers to buy expensive products to which the bacteria is not resistant.[15]
During 1981 and 1988, it was found that out of 348 new drugs from the 25 largest companies in the US, 3% made an important contribution, 13% a modest contribution and 84% little or no contribution to existing therapies. [15]

A drug utilization study, using WHO indicators, conducted at two primary health centres in Pondicherry, India found that the average number of drugs prescribed per encounter was 2.71.[16] Vitamins, antibiotics, analgesics and antihistamines accounted for 80% of the drugs prescribed. Half the patients received injections of vitamin B complex and antibiotics. The results of this study were used to plan an intervention strategy to promote rational drug use.[16]

A survey based on the analysis of approximately 2000 prescriptions, was conducted in six Indian States by the Voluntary Consumer Action Network which comprised of approximately 20 consumer and health organizations. The survey showed alarming and completely irrational prescribing, where tonics, vitamins, expensive drugs and antibiotics were prescribed when they were not indicated.[17] The survey also showed that unnecessary antibiotics were prescribed for diarrhoea, cough mixtures for common colds and anabolic steroids in the case where they were contra-indicated. [17] Incidents where 3 to 4 drugs were prescribed without specific indication, were also recorded. The results of the survey was used to campaign for a prescription audit system in all Indian States. [17]

A study to evaluate the pharmaceutical services in the Northern Province of South Africa found that 55 % of all patients at the clinics received at least one antibiotic. None of the staff of the clinics included in this study were found to be aware of the NDP.[7]

A retrospective study of 410 prescriptions conducted at four clinics in the Western Cape during 1998, showed that a total of 40 % of drugs prescribed were on the EDL and 40 % of the prescriptions were rational in terms of the number and types of drugs prescribed per condition. (Daniels F M - unpublished data)

A prospective study was conducted in Delhi, on 4991 prescriptions, to assess the rationality of drugs against the diagnosis of the case, and to estimate the cost of prescriptions to the consumer against rational costs. It was found that irrational prescribing was common, where the average actual cost of prescriptions was higher than the average rational cost. The researchers recommended training for health professionals on the rational use of drugs and the essential drugs concept.[18]

Buxton asserts that when prescribing, an economic appraisal of alternative drug treatment involves

more than a comparison of their direct cost. Cost and effectiveness must be considered. When expressing cost in monetary terms, cost should include that cost associated with treatment, monitoring and follow-up, the cost of adverse effects and treatment failures as well as cost incurred on the patient for example, time and travel costs. [19]

The use of generic drugs when prescribing, is one of the simplest ways of reducing drug costs in a country. However a study conducted in England showed that only 55% of drugs dispensed were generic drugs. [20] Writing a generic prescription does not ensure that a non branded product is dispensed, especially when the prescriber is not the person who dispenses the medication. Superior treatment involves additional costs and if used, the benefit of such extra costs should be seen.[19]

Studies conducted in Kenya to investigate the impact of training on drug use practices, found that small group in- service training improved the use of drugs.[21] The training emphasized the need to adopt and use the EDL and the Standard Treatment Guidelines. A follow-up study conducted 12 months after the training, showed a decrease in the average number of drugs prescribed per encounter, a decrease in the number of encounters where an antibiotic was prescribed and a decrease in the number of injections prescribed. Dispensing time increased and labeling of drugs improved. The researchers concluded that in-service training had a positive effect on improving the use of medicines in health facilities. [21]

A baseline survey on prescribing practices conducted in rural and urban clinics in Swaziland, following the introduction of a desk top visual aid on appropriate drug therapy, showed a decline in prescriptions which were inappropriate. There was an increase in the number of diarrhoeal disease cases treated with oral re-hydration solution and a decrease in antibiotic use for the treatment of diarrhoea. There was however no improvement in poly-pharmacy, the number of encounters with antibiotics and injections and prescription by generic name.[22] In this survey, nurses reported that prescribing practices were influenced by community perceptions, patient pressure, drug availability, past experiences, peer pressure and the influence of supervisors.[22]

After training in rational drug use was offered to a project group in Yemen, a study found that the number of drugs per encounter, the percentage of antibiotic and the number of injections were lower in the project area than in the control group where no interventions had taken place.[23] In

Uganda, a study conducted after training on rational drug use, found a decline in the use of injections, improvement in the use of Oral Re-hydration in diarrhoea and a decline in the use of anti- diarrhoeal drugs. [23]

A National Drug Policy-Making Board (NDPMB) was appointed in Iran, in 1995, to revise the country's drug policy. Plans were made to set up a drug prescription control committee, which would audit prescriptions and give feedback to doctors on their prescribing behaviors. A pilot project confirmed the effectiveness of this approach, where over prescribing was reduced. It was estimated that such an audit would save the country 10% of it's drug budget, and many people from the side effects of unnecessary drugs. [24]

The Essential Drugs List for Zimbabwe provides the following prescribing guidelines to be considered before writing a prescription :

- Not all patients need drug treatment, advice may be more suitable
- Resist patient demands for injections and capsules
- Prescribe generically
- Avoid combination drugs where possible
- Consider the age, weight and diseases of the patient
- Avoid poly-pharmacy
- Avoid prescribing placebos, advise the patient instead
- Conduct further investigations after treating for 2 to 3 days without improvement. [25]

Rational drug use is underpinned by rational prescribing and dispensing. Efficient dispensing practices include appropriate patient education at initial and follow-up visits, which can take many forms. MacDermott suggests that patients who receive a prescription should receive education which includes the generic and trade names of the drug, the dosage, frequency, length of treatment, the effect and side effects of the drug, which symptoms to report to the doctor and any foods or activities which should be avoided while using the drugs.[26] Non-drug treatment should be promoted either alone or in conjunction with drug therapy.[26] These alternatives include diet, exercise and hygiene which cost less and are less harmful to the patient.

Schommer asserts, that education should be tailored to the patient's individual needs and priorities. Rather than teaching according to a list of topics which should be covered when a

patient receives an initial prescription, a more effective way is to assess the patient's knowledge in terms of what they already know and what they want to and should know.[27]

A study in Southhampton, showed that patients regarded the following drug information as important :

- when and how to take the drugs
- side-effects and how to deal with them
- precautions
- interactions or problems with other drugs
- the name of the drug
- the purpose of the treatment
- what to do if a dose is missed [28]

According to George, the information should be enough for the patient to derive maximum benefit from the treatment with the minimum side-effects. The nature and amount of information will vary from patient to patient. [28]

Studies conducted outside South Africa, have provided information regarding many useful interventions employed to improve drug use practises eg. small group in-service training in Kenya, and the introduction of a desk top visual aid in Swaziland.[21,22] Similar studies need to be conducted in South Africa, where the findings can be used to further develop training programmes to improve drug use in the country.

CHAPTER 3

3. Methodology

This is a quantitative cross-sectional study to assess the knowledge and prescribing practices of registered nurses working at primary health care level. It was assumed that registered nurses are knowledgeable and are applying the principles of rational drug use.

Data was collected through the retrospective review of prescription charts of children 13 years and younger, who attended the clinic between 02 January 1999 and 12 April 1999. Self-administered questionnaires were also completed by registered nurses working at the sampled clinics.

3.1 Study population

The study population included registered nurses working at Primary Health Care facilities in the urban and peri-urban areas of the City of Tygerberg, and in the rural area of Paarl.

Nurses participated in the study if they had been working at the clinic between 02 January 1999 and 30 April 1999, and must have completed the Diploma in General Nursing Science (basic qualification for registration with SANC). Sessional staff (staff who worked in the clinic as replacement for another staff member who was absent for reasons such as maternity or sick leave) were excluded from the study.

3.2 Sampling

3.2.1 Prescriptions

Three levels of sampling was done as follows :

- **Areas**

The area of study was stratified into urban, peri-urban and rural areas.

- **Clinics**

A self weighted sample of four clinics in each area. The clinics were randomly selected, where the selection probability was proportional to the size of the clinic. A total of twelve clinics were included in the study.

- **Prescriptions**

A total of 100 prescriptions from each clinic was selected through systematic random sampling, where the sampling interval was proportional to the number of children 13 years and younger, seen at the clinic. This fixed number results in a self-weighting sample within each area.

3.2.2 Registered nurses

Two levels of sampling were done as follows :

- **Areas**

The area was stratified into urban, peri-urban and rural areas.

- **Clinics**

Purposive sampling of all registered nurses involved in prescribing of medication at the sampled clinics.

3.3 Sample size

The sample size was calculated using EPI Info version 6.0. An expected frequency of 40 % of drugs prescribed according to the EDL was used, which is in accordance with the findings of the study conducted in the Western Cape. (Daniels F M - unpublished) The sample size of 100 prescriptions per clinic was chosen to obtain a 10% precision with 95 % confidence. The total number of prescriptions was 1200.

All registered nurses in each of the sampled clinics, were requested to complete the questionnaire. A response rate of 50 (83%) from a of sample 60 registered nurses was obtained. Fourteen respondents were from the urban area, 22 from the peri-urban area and 14 from the rural area.

3.4 Instrument development

3.4.1 The prescribing indicator form, which was previously developed by the World Health Organization, was modified to reflect the characteristics to measure the validity of the prescription. [23] (See appendix 1)

3.4.2 A structured questionnaire was developed, to identify the nursing qualifications, the level of knowledge and competence of registered nurses regarding rational drug use, and their

training needs. (See appendix 2) The questionnaire was piloted among registered nurses in one clinic, which was not included in the study. Piloting the questionnaire highlighted unclear and ambiguous questions. Inconsistency was found in the rating scales of various questions. The necessary changes were made and the questionnaire was piloted again.

3.5 Data collection

3.5.1 Questionnaires

Participation in the study was voluntary. Questionnaires were delivered to the registered nurse in charge of the clinic, who was informed of the date on which the completed questionnaire would be collected.

Each nurse completed the questionnaire in his/her spare time. Nurses were given two weeks to complete the questionnaire. At the end of the two weeks 60% of the questionnaires were collected. An additional week was given for outstanding questionnaires which pushed the response rate up to 83%.

Information collected includes :

- Nursing qualifications and number of years in practice
- Drug therapy training programmes attended by registered nurses, other than their basic training
- The nurses perceived level of knowledge and competence with regards to the NDP, EDP, EDL and STGs
- The training needs of registered nurses
- The most suitable time to present training programmes for registered nurses working at PHC level (See appendix 2)

3.5.2 Record review

A prescribing indicator form was used to collect information retrospectively, on the prescribing practices of registered nurses at the clinic. A similar indicator form has been successfully used by the same author in a previous study conducted in urban clinics in the City of Tygerberg. (Daniels F M - unpublished) The indicators have also been successfully used in studies, conducted in

Swaziland and Yemen, described in the literature.[22, 23]

Information from thirty prescriptions were recorded on one indicator form which took the researcher approximately 3 hours to complete.

The following information was collected on the prescribing indicator form :

The date of the prescription, the patient's age , number of drugs prescribed per encounter, number of drugs prescribed by generic name, whether the prescription included an antibiotic or injection, the number of drugs prescribed from the EDL and the patient's diagnosis.

The validity of the prescription based on inclusion of : the date, name of the medication, route, dose and frequency for each medication and the signature of the prescriber.

3.6 Data Analysis

Epi - Info version 6.0., Lotus 1-2-3 and Microsoft Excel were used to perform quantitative analysis. Means, frequencies, ranges and percentages were calculated. The Kruskal - Wallis and Yates correction tests were used. A statistical significance level of $p<0.05$ was used.

CHAPTER 4

4. Results

This chapter will depict the knowledge of registered nurses regarding drug prescribing and dispensing, and the extent to which they are applying the concept of rational drug use. The results will be presented under the following headings:

4.1 Characteristics of the sample.

A total of 50 registered nurses participated in the study. Most respondents were registered midwives 49 (98%), followed by community health nurses 38 (76%) and psychiatric nurses 19 (38%). Nurses were also qualified as nurse educators, nurse administrators, paediatric nurses and occupational health nurses.

The most popular certificate courses attended, (which included drug therapy) were primary paediatrics 21 (42%) and family planning 11 (22%). Other courses attended included adult curative, syndromic approach to sexually transmitted diseases, tuberculosis, rational drug use, primary health care, treatment of worm infestations and immunizations.

Most nurses 32 (64%), were registered with the Nursing Council for 10 years and more, and 8 (16%) for 6 to 9 years. The other nurses 10 (20%) were registered for 5 years and less.

A total of 15 (30%) registered nurses worked in a PHC setting for 2 years and less, 19 (38%) for 2 to 5 years, and 16 (32%) for 6 years and more.

4.2 Nurses who were familiar with the NDP, EDL and STG documents and the Essential Drugs programme.

Table 1 : Combined responses of nurses who were familiar with the NDP, EDP, EDL and STGs.

	Yes		No		No response		Total	
	No.	%	No.	%	No.	%	No.	%
NDP	25	50	21	42	4	8	50	100
EDP	29	58	16	32	5	10	50	100
EDL	44	88	4	8	2	4	50	100
STGs	41	82	7	14	2	4	50	100

The registered nurses responses, to the question of whether they were familiar or not with the NDP, EDL and STG documents and the Essential Drugs programme, are displayed in table 1. The expected responses were yes/no. Most nurses were familiar with the EDL 44 (88%) and the STGs 41 (82%).

Table 2. Nurses (per area) familiar with the NDP, EDP, EDL and STGs.

	URBAN N =14		PERI-URBAN N =22		RURAL N = 14	
	Yes	**%**	**Yes**	**%**	**Yes**	**%**
NDP	4	29	11	50	12	86
EDP	7	50	11	50	12	86
EDL	13	93	17	77	14	100
STGs	14	100	13	59	14	100

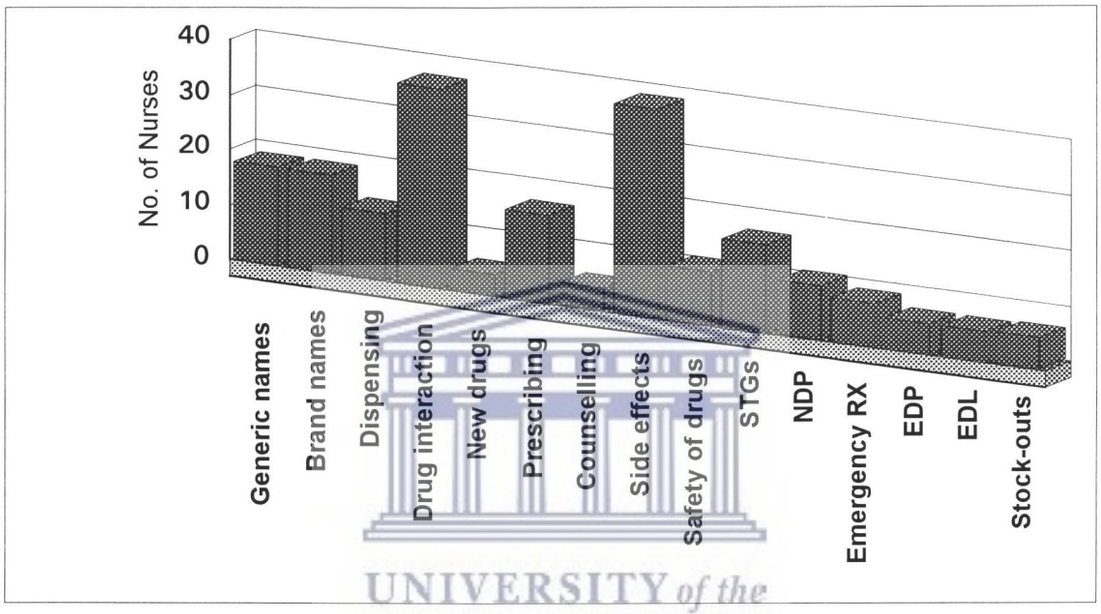
NB. Only positive responses have been used in table 2.

Responses were further stratified by area ie. urban, peri-urban and rural. Responses are displayed in table 2. Most nurses in the rural area 12 (86%) were familiar with the NDP, followed by 11 (50%) in the peri-urban and 4 (29%) in the urban areas. A total of 12 (86%) nurses were familiar the EDP in the rural area, followed by 7 (50%) in the urban and 11 (50%) in the peri-urban areas. All the nurses 14 (100%) in the rural area were familiar with the EDL and STGs. In the Urban area 13 (93%) were familiar with the EDL and 14 (100%) with the STGs, and in the peri-urban area 17 (77%) were familiar with the EDL and 13 (59%) with the STGs.

4.3 Registered nurses' training needs relating to drug therapy

Nurses were asked to list the areas relating to drug therapy in which they needed training. Responses are shown in figure 1.

Fig. 1 Nurses' perception of their need for training. N = 50



Most nurses 38 (76%), indicated that they needed training in the side effects of drugs, followed by drug interactions 36 (72%). An equal number of nurses needed training on generic names and brand names 18 (36%).

A total of 16 (32%) of nurses indicated that they needed training in prescribing and the STGs. The least needed training was on dispensing, new drugs, counselling, safety of the drugs, NDP, emergency treatment, EDP, EDL and Stock-outs.

4.4 The characteristics of a valid prescription

Table 3 : Characteristics of a valid prescription as listed by nurses. N =50

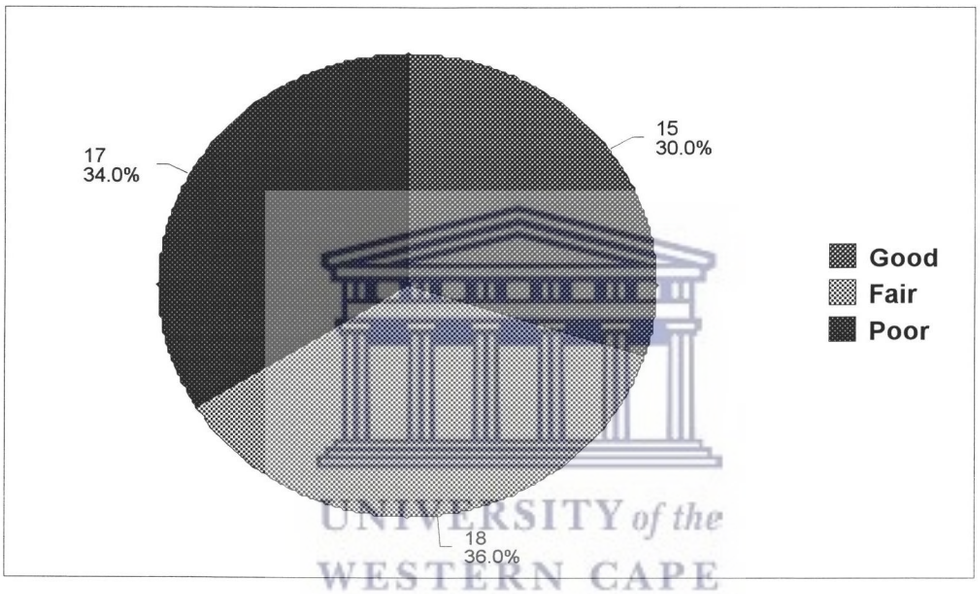
Characteristic	No.	%
Other eg. weight and age of client, lot number of the medication	33	66
Dosage	32	64
Name of the drug	27	54
Date of prescription	25	50
Duration of treatment	21	42
Frequency	21	42
Signature of the prescriber	15	30
Schedule	12	24
Route of administration	7	14

Nurses were asked to list the important characteristics which make a prescription valid. Table 3 displays their responses. Most nurses 33 (66%) indicated that the weight, age, and the lot number of the medication were important, followed by the dosage 32 (64%), the name of the drug 27 (54%) and the date of prescription 25 (50%). Only 7 (14%) indicated that the route of administration should be reflected on the prescription.

4.5 Knowledge in prescribing , dispensing and counselling at PHC level

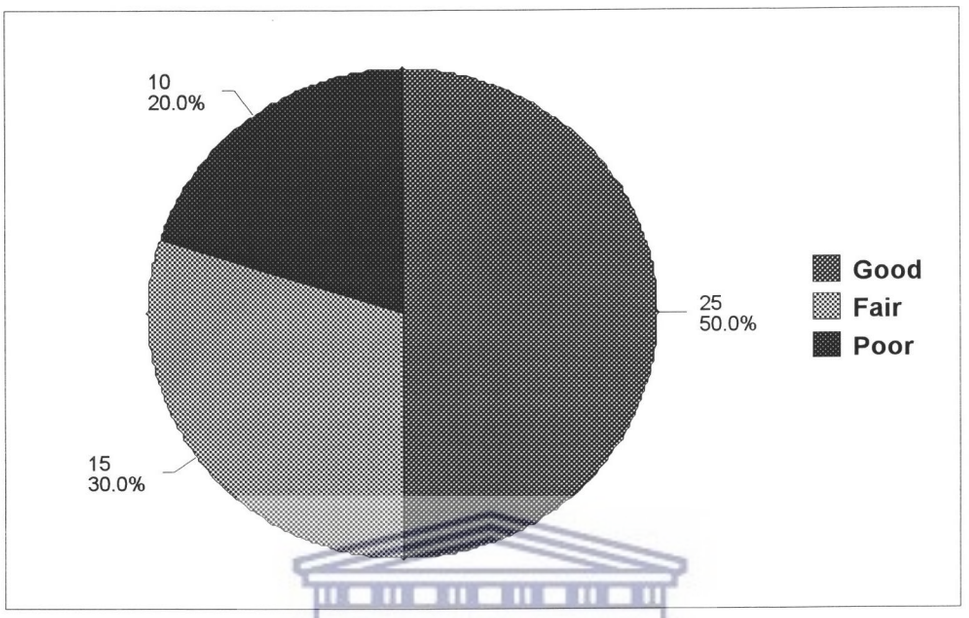
The information on the perceived level of knowledge of nurses regarding prescribing, dispensing and counselling at PHC level, was obtained from a self administered questionnaire. Nurses were expected to rate their knowledge according to three responses where 1 = poor, 2 = fair and 3 = good. (See 1.6 for criteria)

Fig. 2 : Nurses' perception of their level of knowledge in prescribing at PHC level.



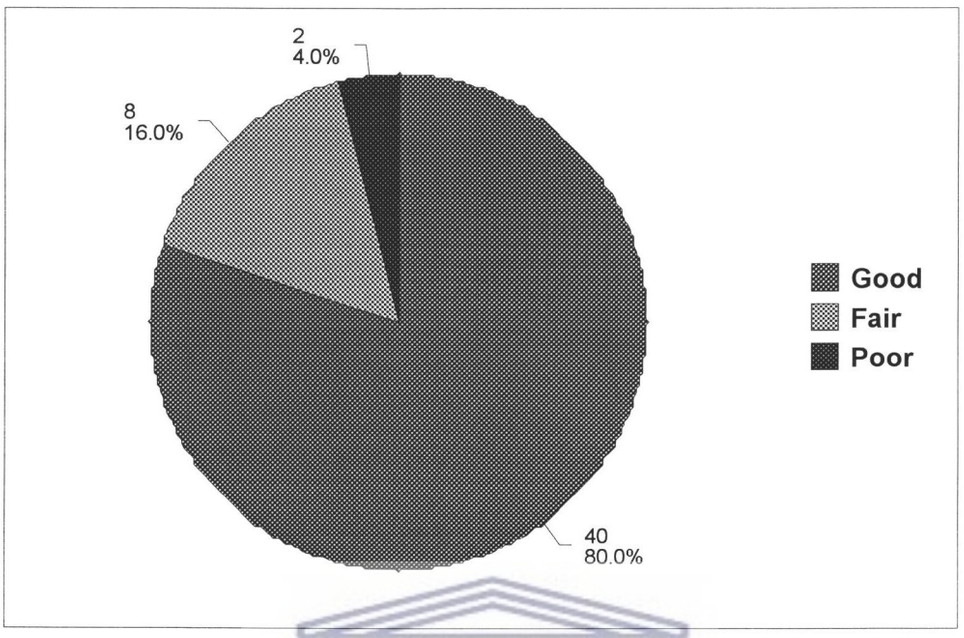
The aspects according to which the nurse had to rate herself included : choice of drug for a specific diagnosis, the interaction of drugs with other substances such as alcohol, dosage, form (e g. tablet or syrup), legal responsibility, duration of treatment, safety of the drugs, side effects, brand names, generic names, drugs on EDL and the standard treatment guidelines. A total of 17 (34%) of nurses had poor knowledge of prescribing, 18 (36%) had a fair knowledge and15 (30%) had good knowledge.(See figure 2).

Fig 3 : Nurses' perception of their level of knowledge in dispensing at PHC level.



The aspects according to which the nurse had to rate her level of knowledge in dispensing included : expiry dates, storage conditions, ordering systems, availability of drugs in the clinic, the management of stock-outs and the labelling of prescribed drugs. Twenty five (50%) nurses had good knowledge about the dispensing of drugs and 15(30%) fair knowledge. Only 10(20%) rated themselves as having poor knowledge. (See figure 3).

Fig 4 : Nurses' perception of their level of knowledge in counselling at PHC level.

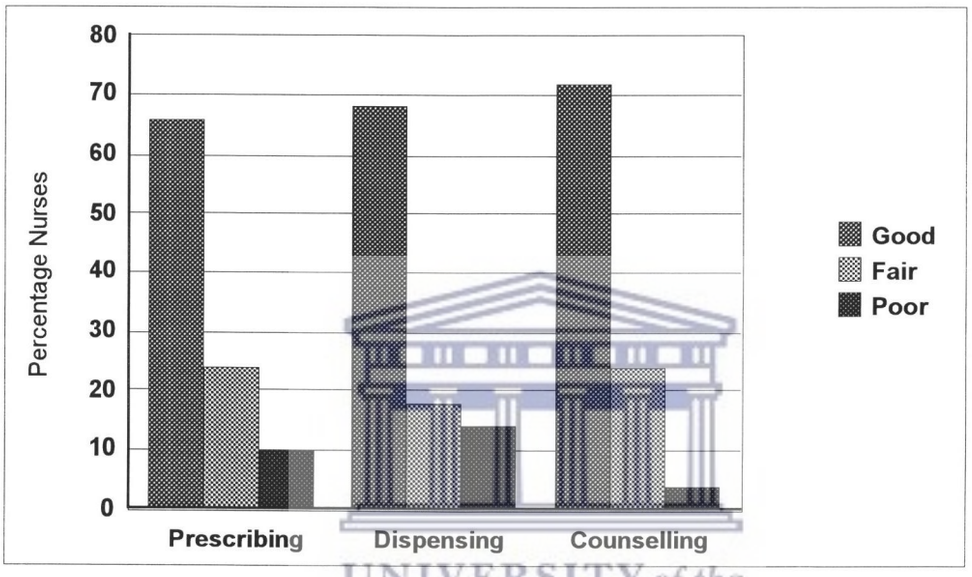


Nurses had to rate their knowledge regarding patient counselling on the use of drugs. Results of the responses are shown in figure 4. Very few nurses 2 (4%) had poor knowledge of counselling, while majority of nurses 40(80%) had good knowledge of counselling.

4.6 Competence in prescribing, dispensing and counselling.

The same criteria and options used to measure the nurses' knowledge, was used to measure their competence. (See 1.6)

Fig 5 : Nurses perception of their competence in prescribing, dispensing and counselling.



Most nurses rated themselves competent. A total of 33 (66%) in prescribing, 34(68%) in dispensing and 36 (72 %) in counselling. (See figure 5).

4.7 Prescribing practices

Table 4 : Nurses' prescribing practices at 12 clinics

Clinic	Belhar I	Belhar II	Bellville South	Delft	Site B	Nolungile	Matthew Goniwe	Mfuleni	JJ Du Pre	Dalvale	Mbekweni	Klein Nederberg	National Standard
No. of prescriptions	100	100	100	100	100	100	100	100	100	100	100	100	
Ave no. drugs prescribed per encounter	2	1.9	2.1	2.9	2.7	2.4	2.6	2	1.8	1.4	2.1	1.4	1.3 - 3.8
% encounters where only health education was given	0	0	4	0	0	0	0	0	3	4	4	8	
% Generic prescriptions	2	0	0	0	10	7	2	6	1	0	1	1	37 - 94 %
% Prescriptions with antibiotics	48	53	55	65	53	54	67	74	54	58	62	37	27 - 63 %
% Prescriptions with injections	0	0	0	0	2	0	0	0	1	0	3	0	0.2 - 10 %
% Prescribed drugs on EDL	64	60	71	71	60	63	86	64	65	70	77	55	86 - 88 %
% Valid prescriptions	0	2	21	6	31	0	0	15	14	6	13	9	

Nurses' prescribing practices

Using the prescriber indicator form, the prescription charts of children born between 1986 and 1999 (13 years and younger) were reviewed. Only prescriptions written between 02 January 1999 and 12 April 1999, were reviewed.

The most often presented conditions at the 12 clinics included ear, nose and throat, skin, gastro-intestinal and respiratory conditions.

The prescriptions were regarded as valid if they were legible, signed, indicated the route of administration, the frequency and the dose to be taken.

A total of 1187 (99%) of prescriptions were legible, 1189 (99%) were signed, 136 (11%) indicated the route of administration, 806 (67%) the frequency and 793(66%) the dose. Only 117 (9.7%) of prescriptions were regarded as valid.

The national standards in table 4 refers to the "desired national standard" (Eagles P 1999 - personal communication).

4.8 Comparison of trends in prescribing between nurses in urban, peri-urban and rural areas.

Table 5 : Comparison of nurses' prescribing trends according to areas.

Indicator	Urban N=400	Peri-urban N=400	Rural N=400	p-value
Average no. of drugs	2.232 ~ *	2.408 ~ #	1.675 * #	< 0.001
No. generic prescriptions	2 ~	25 ~ #	3 #	< 0.001
No. prescriptions with antibiotics	221	248 #	211#	0.024
No. prescriptions with injections	0	2	4	0.1
Average no. drugs on EDL	1.498 *	1.535 #	1.138 * #	< 0.001

Significant differences between areas are indicated as follows :

(~) between urban and peri-urban areas.

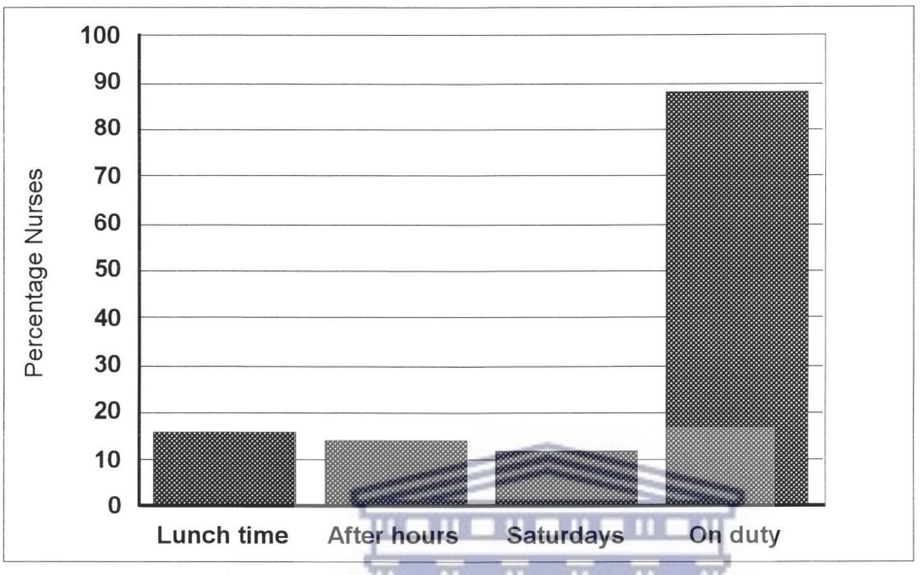
(*) between urban and rural areas.

(#) between peri-urban and rural areas.

The difference in the average number of drugs prescribed per encounter in the urban and peri-urban area was 0.176 ($p<0.05$), urban and rural areas 0.557 ($p<0.001$) and peri-urban and rural area 0.733 ($p<0.001$). The difference in the number of generic prescriptions in urban and peri-urban areas was 23 ($p<0.001$), rural and peri-urban areas 22 ($p<0.001$) and urban and rural areas 1 ($p=1$). The difference in the number of encounters with an antibiotic in urban and peri - urban area was 27 ($p>0.05$), urban and rural areas 10 ($p>0.05$) and peri-urban and rural areas 37 ($p<0.05$). The difference in the average number of drugs prescribed from the EDL in urban and peri-urban area 0.037 ($p>0.05$), peri-urban and rural areas 0.397 ($p<0.001$) and urban and rural areas 0.360 ($p<0.001$). There was very little difference in the number of prescriptions with injections, in the 3 areas ($p>0.05$).

4.9 Training relating to drug therapy

Fig 6 : The most suitable time for nurses to attend training sessions.



Nurses were also requested to choose the time they thought were most suitable for them to attend training sessions. They had the following options : lunch time, after hours, Saturdays and on duty time. Results are shown in figure 6. Most nurses (88%) chose on duty time as the most suitable to attend training.

CHAPTER 5

5. Discussion

The aim of the study was to assess the knowledge of registered nurses regarding prescribing and dispensing, and to assess their prescribing practices at PHC level. Differences in the prescribing practices of nurses in the urban, peri-urban and rural areas were also determined. This chapter describes the knowledge and extent to which registered nurses are applying the concept of rational drug use.

Although 64% of the registered nurses were qualified for10 years and more, only 10% had worked in a PHC setting for10 years or more. This indicates that experience should be considered when assessing the competencies and prescribing practices of registered nurses, since knowledge and skills usually increase with practice and experience.

The number of nurses who attended training courses which included drug therapy, was low. Primary Paediatrics, which is regarded by nurses as the course which equips the nurse to diagnose and prescribe for childhood diseases, was attended by only 42% of the participants. It is however interesting to note that 10 (70%) of the nurses in the rural area and 7(50%) of the nurses in the urban area had attended the Primary Paediatrics course. This is evident in their response to the question (see appendix 2), on whether they were familiar with the NDP, EDP, EDL and STGs (see table 2). Although the figures for the peri-urban area were lower than that of the urban and rural areas, for most responses, they were not lower than 50%. (see table 2) It is evident that the lack of knowledge is directly associated with the lack of training. It has been proven in the study conducted in Kenya, that in-service training has a positive effect on drug use practices.[21]

Nurses in all 3 areas, were more familiar with the EDL and STGs than with the NDP and EDP (see table2). This could be due to the fact that the Standard Treatment Guidelines and Essential Drugs List is available and used at PHC level. Overall, the rural area had the highest percentage of nurses who are familiar with the NDP, EDP, EDL and STGs. This however is not reflected in their prescribing practices which show a low percentage of prescriptions written by generic name and a low percentage of drugs prescribed from the EDL (see tables 4 and 5). The findings of the study regarding the nurses' knowledge should therefore be interpreted with caution, since responses to self perceived knowledge tend to be subjective.

At two clinics in the urban area, none of the nurses knew about the NDP and at one clinic, none knew about the EDP. This is consistent with the findings of the study conducted in the Northern Province where none of the nurses knew about the NDP. [5]

The assessment of the perceived level of knowledge and competence in prescribing, dispensing and counselling at PHC level, found that more nurses rated themselves knowledgeable regarding dispensing (50%) and counselling (80%), than with prescribing (30%) (see figures 2,3,4). Information obtained from the self administered questionnaire, showed that the aspects of prescribing in which nurses were least knowledgeable were : the interaction of drugs, side-effects of medication and brand names as opposed to the generic names of drugs. These findings reflect the areas of training requested by registered nurses. Although few nurses indicated the need for training in the NDP, EDP and EDL, the training needs identified by the nurses would constitute the content of a course focussing on the NDP, EDP and EDL (see figure1).

It can therefore be concluded, that registered nurses perceived themselves more knowledgeable and competent in dispensing and counselling than in prescribing. These differences in knowledge and competence can be due to the following : prescribing, compared to dispensing and counselling, is a relatively new function for many nurses, less than 42% of all the nurses who participated in the study had attended the Primary Paediatrics course and most nurses (68%) have worked in a PHC setting for less than 5 years. Training and the number of years experience usually influence knowledge and competence.

From the retrospective review of records, diseases were classified according to systems as set out in the Standard Treatment Guidelines and Essential Drugs List 1998 edition.[8] Children were seen most frequently with ENT conditions at 6 clinics. It is common for gastro- intestinal conditions to occur during summer, however this (mainly diarrhoea and vomiting) was found to be the most frequently occurring disease group at only two clinics in the peri - urban area. Although not reflected on the records, this could be due to effective health education. It is also possible that people do not bring their children to the clinic because they visit a private doctor or treat the patient at home.

Seasonal variations were not evident because the retrospective study was conducted on prescriptions written within a 4 month period.

Each of the 12 clinics' average number of drugs prescribed per encounter, was lower than the

"desired national standard " of 1.3% - 3.8%. The lowest average number of drugs per encounter was 1.4 and the highest 2.9.

The clinic with the lowest average number of drugs prescribed per encounter (1.4), was the clinic with the highest percentage of encounters where only health education was given (8%). This clinic also had the lowest percentage of prescriptions where an antibiotic was prescribed (37%). It was found that health education given alone or in conjunction with drug therapy, was often recorded on the prescription chart of the child. According to Mac Dermott non drug treatment costs less and is less harmful to the patient.[26] However, patient education was not always recorded. Poor record keeping contributes to irrational prescribing, since rational prescribing includes the writing of prescriptions which are legible and contain all the relevant information. Although patient numbers vary from clinic to clinic, the quality of the service should not be sacrificed as a means of coping with high patient numbers. Alternative solutions should be investigated.

This study did not investigate whether each prescribed drug was relevant to the specific diagnosis, according to the Standard Treatment Guidelines. Inconsistencies were however obvious eg. the number of drugs prescribed to treat a specific diagnosis differed. At one clinic in the peri-urban area, prescriptions showed that impetigo was treated with between 2 to 5 drugs. The STGs indicate that impetigo is treated with 2 drugs. Over- prescribing of drugs in such cases, were obvious. Special care was taken to determine possible multiple diagnoses and symptoms. A study conducted in six Indian States revealed similar findings, where drugs were prescribed when they were not indicated. [17] The Standard Treatment Guidelines should be seen as a useful tool in preventing such inconsistencies in treatment, and over-prescribing.

The study found that the percentage of prescriptions by generic name were very low, the range was between 0% - 10% , compared to the "desired national standard " of 37% - 94%, as well as with the results of previous studies. [21] This study was retrospective and did not determine which drugs were actually dispensed. It would be useful to conduct a study, to determine whether a generic drug was dispensed when the drug was prescribed by brand name. The low percentage of prescriptions written by generic name could be a reflection that the EDL and STGs are not used. A higher percentage is expected if the EDL and STGs were used, because the drugs suggested in the STGs are listed in the EDL and are generic drugs. The EDL provides examples of a therapeutic class and not necessarily the drug of choice.[8] It was found that drugs such as Bactrim

and Purbac were prescribed for gastro-intestinal conditions, where Trimethoprim or Sulfamethoxazole is indicated in the EDL. The same applies when nurses prescribe Amoxil instead of Amoxycillin.

The number of prescriptions with antibiotics, at 3 clinics, were above the "desired national standard". At the clinic with the highest antibiotic use 74%, a total of 60% of children presented with ENT conditions (mainly tonsilitis) , which according to the STGs is treated with an antibiotic. It is possible that disease patterns influenced antibiotic use at that clinic. However, irrational prescribing of antibiotics does occur eg. at a clinic in the urban area, the prescriber found the patient to be clinically well, but indicated that she prescribed an antibiotic, because the mother insisted. This coincides with findings of a survey done in Swaziland, where nurses reported that prescribing practices were influenced by community perceptions and patient pressure.[22]

Irrational prescribing at one peri-urban clinic was obvious. It was found that one prescriber on five occasions gave 1 to 3 drugs to a patient even when on examination, the patient was found to be clinically well. On another occasion, the same prescriber , prescribed Vermox for ringworms. On seven occasions at the same clinic, Sorol (oral rehydration solution) and Bactrim was prescribed for patients with diarrhoea. According to Fourie this is ineffective and irrational.[15]

The percentage of injections prescribed, in all 3 areas, were low and ranged between 0%-3%, in comparison with the "desired national standard " of 0.2%-10%.

Only 1 peri-urban clinic was within the "desired national standard " for the number of drugs prescribed on the EDL. (86 %) The other clinics were below the " desired national standard " of 86%-88%. The drugs available at the clinic for the treatment of minor ailments, were often not on the EDL. For example, the ointment (Zinc and Castor oil) used for the treatment of skin conditions eg. rashes, which was one of the top occurring conditions presenting at clinics, was not on the EDL. Clinics receive a pre-mixed ointment of Zinc and Castor oil, Zinc is on the EDL and Castor oil not. It is possible that the reason why Zinc and Castor oil (which is not on the EDL) is being used, is an attempt to use up all the stock at hand.

Although prescriptions were legible and signed, the percentage of prescriptions regarded as valid were low because of failure to indicate eg. the route of administration of medication. It was found

in this study, that nurses trained in Primary Paediatrics were more inclined to indicate the route of administration.

Prescriptions were found to be incomplete and reflected different combinations of characteristics, which registered nurses regarded as important information on a prescription. Only 117 (9.8%) of the 1200 prescriptions were regarded as valid. This is consistent with the response to a question in the self administered questionnaire, on the characteristics of a valid prescription, where nurses gave different combination of characteristics, which they regard as important (see table 3). The list of characteristics given by the nurses, differ from those in the Rational Drug Prescribing Training Course Manual which includes the address of the prescriber and patient, the form of the drug, the total amount to be dispensed and the specific instructions and warnings to the patient.[6]

There was a significant difference, in the average number of drugs prescribed in the urban and peri-urban areas. The difference between the number of prescriptions written by generic name, in urban and peri-urban areas and peri-urban and rural areas, was significant. While the difference between the urban and rural areas was not significant. The number of encounters with antibiotics, was significantly different between peri-urban and rural areas. The average number of drugs prescribed on EDL, differed significantly between peri-urban and rural areas and between urban and rural areas.

The study found that most nurse preferred training to occur during their on duty time. For this question (see appendix 2), some nurses chose more than one option (see figure 6). The choice of on duty time could be due to many reasons including : nurses have other commitments to attend to after hours and on a Saturday, lunch time is too short and patient movement in the clinic during lunch time will create a disturbance. Attending training away from the clinic will enable the nurse to focus on the training.

CHAPTER 6

6.1 Conclusion

The findings of the study show that although nurses perceive themselves as knowledgeable in prescribing, dispensing and counselling, irrational prescribing of drugs is still a major problem. Registered nurses do not fully apply the concept of rational drug use. Their prescribing practices reflect the need for appropriate training in rational drug use. According to the Guide for Good Prescribing, bad prescribing habits lead to ineffective and unsafe treatment, which worsens and prolongs the illness, causing harm and distress to the patient and escalating costs for the country.[11] As a result, patient load increases and staff morale decreases.

It is clear that the adoption of the EDP, EDL and STGs are not enough. The programme will not be successful if it is not accompanied by training programmes for both health workers and patients. Since nurses contribute to the programme, training in prescribing and dispensing, as shown in this study, is important to improve the rational use of drugs by nurses.

6.2 Recommendations

Based on the findings of the study the following is recommended :

6.2.1 Training

- Curricular for basic training of nurses should offer a pharmacology course, which focusses on the NDP, EDP, EDL and STGs in preparation for nurses who will work in a PHC setting directly after training.
- Post Basic courses: eg. Community Nursing Science, should also prepare nurses to function in the community setting by teaching practical application of the relevant aspects of the NDP, EDP, EDL and STGs on the most commonly occurring diseases.
- All other in-service training certificate courses, should apply the NDP, EDP, EDL and STGs: eg. Primary Paediatrics and Adult Curative courses.
- The distribution of guidelines, relating to drug therapy, should be accompanied by the training of personnel.
- In- service training or the issuing of circulars/protocols to nurses at PHC level, on the correct method of prescription writing, to ensure correctness and consistency.

- One day workshops can be held as an interim measure, to introduce the large number of nurses who have not attended any course relating to the EDP, EDL and STGs. These can be held on the day of the week, on which the clinic is least busy. The number of participants will depend on the number of staff the clinic can afford to release, without causing a disruption in the service. The results indicate that nurses prefer to attend training courses during their on duty time.

  The one day workshops could be divided into two sessions:

  - one focussing on the introduction to the NDP and EDP
  - a second focussing on the EDL and STGs

  Offering two courses will allow nurses to choose which course they need most, depending on their knowledge and competence.

- Nurses who have attended courses which include training in drug therapy before the introduction of the EDP, EDL and STGs should be updated. Universities and colleges should offer short courses (1 to 2 weeks), for this purpose. This should be an intensive course focussing on application. The manager of the clinic should determine how many staff members they are able to send on such a course at one particular time, without disrupting the functioning of the clinic.

- Authorities should keep a register of the training courses attended by nurses. It should become compulsory, that nurses attend courses to update their knowledge and skills. A cyclic system could be adopted: eg. nurses who have attended the Primary Paediatrics courses, should attend an updated course every 2 to3 years. Alternatively, in-service updates could be offered on a regular basis: eg. every two months.

- Drug information centres should be established and made operational from universities. Practitioners should be linked via computer and telephone to such centres. These centres should be utilized by patients in need of objective drug information.

6.2.2 Further research

The following studies are recommended :

- A study to measure the impact of training (as suggested in 6.2.1)
- An investigation of the availability and use of the EDL and STGs at clinics
- An investigation of dispensing practices eg. which drugs are dispensed when a prescription is written using brand names.
- The measurement of adherence to EDL and STGs ie.a study into the rationality of prescribing in terms of which drugs are prescribed for a specific condition and poly-pharmacy.

6.3 Limitations

- Methodology - It is recommended in the WHO guidelines [23] that at least 20 health facilities should be included in a cross-sectional study. However, if fewer facilities are included in the study a larger number of encounters should be selected in each facility. [23] The second option was used in this study. It was found, that the prescribing practices of individuals were more or less consistent. Less than 100 prescriptions per facility, would have given a good enough indication of the prescribing practices of nurses. In this event, more facilities could have been included in the study.
- Seasonal variations were not determined because prescriptions written between January and April 1999 were used. The researcher ascertained that staff changes had occurred at many clinics since the beginning of 1999. Therefore the motivation for using recent prescriptions, was that the prescription should have been written by the nurses currently working at the clinic. Because of staff changes, very few prescriptions written over a 1 year period would reflect the prescribing practices of nurses currently working at the clinic.

- Administration of questionnaire - a higher response rate would have been attained if the questionnaires were administered by the researcher. Self addressed envelopes could also have been used. Because the questionnaires were self-administered (completed by the participants), 17% of the questionnaires were not returned. These participants had either

been transferred to another clinic, were on leave or sick leave. The objective of time saving by this method of administering the questionnaires , was not achieved since the researcher had to extend the period allocated for the completion of the questionnaires.

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