

# Primary care drug therapy training:

## The solution for PHC nurses?

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### ABSTRACT

The priority of the National Health System in South Africa is primary health care (PHC). The approach involves a health system led by PHC services and includes personal and curative services for acute minor ailments delivered by PHC nurses. The nurses are also responsible for the treatment of these ailments with essential drugs according to protocols as proposed in the Essential Drugs List. A before-after experimental research design was used to evaluate the effect of a competency-based primary care drug therapy (PCDT) training programme for PHC nurses in the treatment of acute minor ailments. An experimental group (n=35) and control group (n=31) consisting of registered nurses undergoing training in PHC at Gold Fields Nursing College were randomly selected. The results showed a significant increase in prescribing outcomes and medicine utilisation.

### OPSOMMING

Primêre gesondheidsorg (PGS) is die prioriteit van die nasionale gesondheidsstelsel in Suid-Afrika. Die benadering behels 'n omvattende gesondheidsstelsel en sluit genesingsdienste vir akute geringe ongesteldhede deur PGS-verpleegkundiges in. PGS-verpleegkundiges is ook verantwoordelik vir die behandeling van hierdie ongesteldhede met vasgestelde protokolle soos voorgeskryf in die Essensiële Medisyne Lys. 'n Tweegroep eksperimentele navorsingsontwerp is gebruik om die effek van die bevoegdheidsgebaseerde primêresorggeneesmiddel terapie opleidingsprogram in akute geringe ongesteldhede vir PGS-verpleegkundiges te evalueer. 'n Eksperimentele groep (n=35) en 'n kontrolegroep (n=31) bestaande uit geregistreerde verpleegkundiges wat opleiding in PGS aan die Gold Fields Verpleegkollege ondergaan, is ewekansig geselekteer. Die resultate het getoon dat die opleidingsprogram beduidend bygedra het tot die rasionele voorskryf en benutting van essensiële medisyne.  
**Sleutelwoorde:** Primêre gesondheids-

### KEY WORDS

Primary Health Care  
Primary Care Drug Therapy  
Primary Health Care Nurse  
Essential drugs  
Primary Health Care training  
Nursing Pharmacology  
Competency-based training

sorg, Primêresorg-geneesmiddel terapie, Farmakologie, Primêre gesondheidsorg-verpleegkundige, Bevoegdheidsgebaseerde opleiding, Leerder-gesentreerde benadering.

The vast majority of medical problems seen in primary health care (PHC) consist of commonly occurring conditions. Most of these conditions are easy to recognise and for which basic treatment is reasonably standard (Evian, 1989:36). In the PHC setting only approximately 10% of all the medical problems encountered are of a more complex nature and require more sophisticated management approaches. Evian (1989:36) argues that an adequately trained PHC nurse can more than adequately diagnose and treat 90% of the clinical PHC load which include personal curative services for **acute minor ailments** and the provision of **essential drugs** (South Africa, 1997:37).

Registered nurses in general have inadequate and sometimes even little knowledge of pharmacology. To ensure the rational use of essential drugs on PHC level in South Africa PHC nurses should be trained in basic pharmacology (Oelofse, 1996:1). The PHC nurse should therefore receive adequate and competent training in all the aspects of treatment with essential drugs, such as drug indication, contra-indication, dose, interaction, adverse effects, overdoses, special precautions and good dispensing practices (Dreyer, 1996:i; Irwig *et al.*, 1985:92; Oelofse, 1996:1). The World Health Organisation (1995:1) empha-

sises these training objectives but suggests that the approach in pharmacology training should not be drug-centred but diagnosis-centred, thus from **diagnosis to the drug**, in order to enhance the therapeutic skills and competence of the prescriber.

## BACKGROUND ON THE RESEARCH

The general objective of this research was to develop and evaluate a competency-based primary care drug therapy-training programme in the treatment of acute minor ailments for PHC nurses. The concept of primary care drug therapy being the use of essential drugs in the rational treatment of a disease making use of knowledge of the disease process as the fundamental point of departure. A specific objective was to determine the effect of the competency-based primary care drug therapy-training programme in acute minor ailments on PHC nurses with regard to rational prescribing and rational medicine utilisation.

A before-after research design (Arnold *et al.*, 1998:377) was used as an experimental design. This design makes it possible to determine the effect of the independent variable (training programme) on the dependent variable [knowledge and outcomes viz. rational prescribing and medicine utilisation of PHC nurses] (Huysamen, 1993:90). A pre-test was used to determine if the experimental and control groups differed significantly. A post-test was used to compare the change in knowledge and outcomes of the experimental and control groups directly after the training programme.

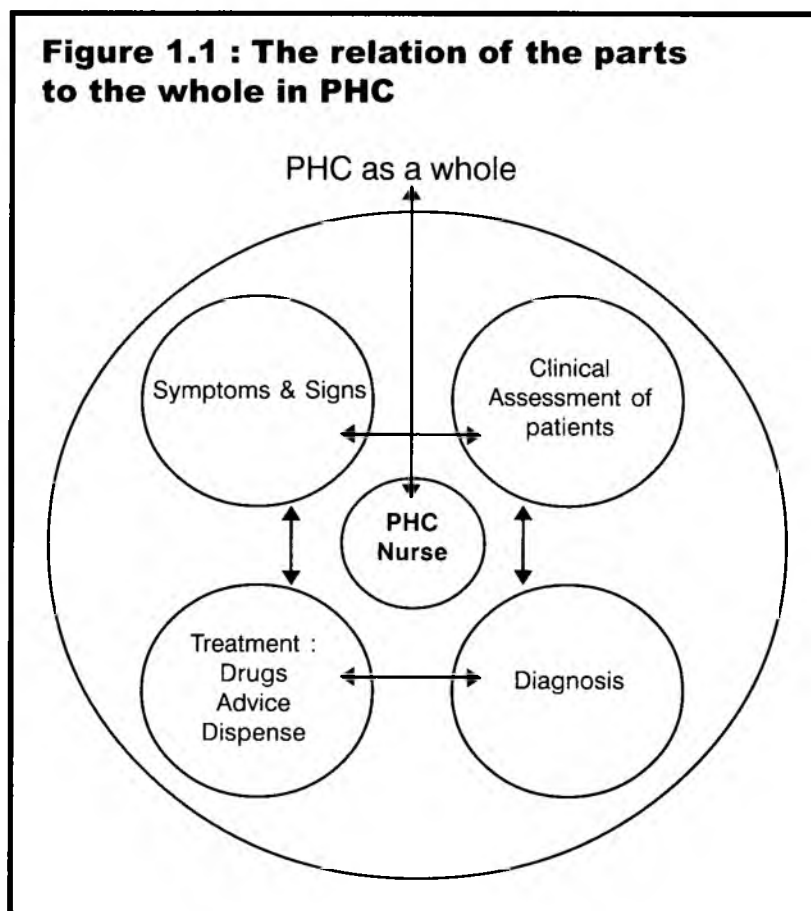
The data was analysed by using the SAS computer package (SAS Institute, 1985). Descriptive and inferential statistics were used to analyse the research results. Paired t-tests were used to determine the differences between the pre and post-tests of the experimental and control groups (De Wet *et al.*, 1981:188). The statistical significance (p) and practical significance (d) of the results were determined.

The training programme was developed and presented from a trainee (Barr & Tagg, 1995) and person-centred approach (Bandura, 1986; 1997; Rogers, 1980; 1983) endorsing the principles of adult learning (Knowles, 1987:170-173) and the philosophy of competence (Dall'Alba & Sandberg, 1996). The principles of competency-based training for primary care drug therapy can be simplified as the point of departure being the nurses' experience in PHC and the PHC setting as a whole (See Figure 1.1). This

implies that the significance of proper drug treatment must be brought in relation to the aspects of PHC, namely: the clinical assessment of patients; the symptoms and signs of different illnesses; the differential diagnoses; and possible complications. Thus, endorsing experience in the essential parts of the practice of PHC and the integrated knowing-doing thereof. Only then can competence learning of safe treatment with drugs on PHC level be ensured.

treatment, and good dispensing practices were emphasised during the discussion of each condition. At the end of each system there was a repeat discussion on the basic pharmacology and dispensing practices in order to ensure the proper learning of the pharmacology of the drugs used in the treatment of that specific minor ailment.

The following minor ailments/conditions were included in the programme for



## The primary care drug therapy-training programme

The training programme (supported by a manual) was holistic in nature. The trainee (nurse) was brought into a clinical primary health care situation to empower her/him to share and use embedded knowledge and skills in order to achieve new knowledge and skills sufficiently. By starting with a quick clinical assessment of each system, e.g. the eyes, the programme manages to achieve this. The assessment was followed by specific acute minor ailments for each system, e.g. conjunctivitis. The manual provided a colour picture and a definition of each condition. The symptoms, signs, differential diagnoses, complications and treatment of each condition were gathered through group discussions and the sharing of experiences during the presentation of the course. The pharmacological aspects of each

treatment with essential drugs:

- **The eyes:** conjunctivitis, dacryocystitis, external stye, chalazion, blepharitis, dry eye, trachoma, pinguecula, pterygium, arc eyes, subconjunctival bleeding, lid contusion, foreign body in eye, eyelid burns, chemical burns to the eye, acute glaucoma, and general medical disorders affecting the eye.
- **The oral cavity:** primary herpes gingivostomatitis, cold sores, aphthous ulcers, thrush, gingivitis, mumps, sialolithiasis, tooth abscess and ache, and conditions affecting the tongue.
- **The ear:** otitis externa, otitis media, and foreign bodies in the ear.
- **The nose:** hayfever, acute sinusitis, nose bleeds, and foreign bodies in the nose.
- **The throat:** tonsillitis and pharyngitis.
- **General ear nose and throat (ENT) conditions viz.:** common cold and in-

fluenza, glandular fever, measles, rubella, chickenpox, tick bite fever, malaria, and meningitis (as differential diagnosis).

- **The lungs:** coughing, acute bronchitis, croup, and acute asthma.
- **The abdomen:** appendicitis, diarrhoea, nausea and vomiting, cholera, constipation, dyspepsia and heartburn, haemorrhoids, worm infestation, and serious differential diagnosis regarding the gastrointestinal tract viz.: peptic ulcer, hepatitis, cirrhosis, peritonitis, obstruction, portal hypertension, and angina pectoris.
- **The kidneys and bladder:** cystitis and pyelonephritis.
- **The musculo-skeletal system:** acute gout, infectious arthritis, backache (sciatica), inflammatory connective tissue conditions e.g. bursitis and fibrositis.

The drugs included in the training programme were taken from the Essential Drugs Programme as prescribed by the Government of South Africa (South Africa, 1996), as well as drugs that may be included in the Essential Drugs Programme in the future (Serfontein, 1997) and common over-the-counter drugs used/bought by patients. The following drugs were included in the training programme:

albendazole, aminoglycosides, aminophylline, amoxicillin, antacids, anthelmintics, antihistamines, aspirin, beclomethasone inhaler, bismuth suppositories and ointment, chlorhexidine mouthwash, ciprofloxacin, colchicine, cold and flu preparations, corticosteroids, cotrimoxazole, cough syrups, cyclizine, diclophenac, doxycycline, electrolytes, erythromycin, fluorescein sodium minims 2%, gentian violet, hydrocortisone injection, hyoscine N butylbromide, ibuprofen, laxatives, liquid paraffin, loperamide, mebendazole, metoclopramide, methenamine hippurate, methenamine mandelate, methylsalicylate ointment, metronidazole, miconazole oral gel, mist pot cit, naproxen, niclosamide, nitrofurantoin, nose drops, nystatin suspension, paracetamol, penicillin, piperazine, povidone iodine mouthwash, prednisolone, salbutamol inhaler, senna, tetracycline eye ointment, theophylline, urinary tract antiseptics, and urinary alkalinizers.

A differentiation was made between serious and less serious conditions and whether treatment on PHC level was safe and sufficient or referral to a secondary level is indicated.

A medical practitioner, a dentist (oral cavity), a pharmacist and a practising PHC nurse edited the content of the training programme.

## Sample

The objective was to develop a universal training programme and to evaluate its outcomes for a specific group of primary health care nurses. Therefore it was decided to evaluate the training programme at one training institution involved in the training of primary health care nurses in South Africa (viz. Gold Fields Nursing College).

The sample ( $n = 66$ ) consisted of nurses undergoing training in primary health care at Gold Fields Nursing College. All of them were registered nurses with experience in primary health care. The college selected the nurses for this training throughout South Africa. The group was randomly divided into an experimental ( $n = 35$ ) and control group ( $n = 31$ ). Four participants in the control group, however, were not able to attend the post-testing and were therefore excluded from the study (Thus,  $n=31$  for the control group). A comparison between the two groups provided the outcomes of the study.

## The measuring instrument

Eight case studies were used to measure prescribing and medicine utilisation outcomes of respondents before and after the training programme.

The case studies (see Appendix A) were developed out of constructs in the literature such as the Essential Drugs Programme of South Africa (South Africa, 1996) and clinical textbooks (Berkow *et al.*, 1992; Tierney *et al.*, 1997). Support for the selection of conditions/ailments in the case studies came from experiences the researcher had in PHC clinics as well as interviews with a primary health care nurse in charge of education and training in the Potchefstroom District Health Department (De Wet, 1997), and a general practitioner in the public and private sector (Muller, 1997). The conditions/ailments used as case studies were addressed during the facilitation of the course and are described in the course manual.

The objectives of the case studies were:

- To measure the participants' ability to recognise the selected conditions/ailments;
- to measure their ability to treat rationally according to prescribed protocols (South Africa, 1996), thus prescribing outcomes; and
- to measure medicine utilisation and prescribing patterns.

The case studies measured eight conditions/ailments. A colour photo (except for Case study 5) and a description of

the symptoms and signs expected to encounter in each condition/ailment accompanied each case study. The case studies were divided into a diagnosis, possible differential diagnosis, suggested treatment, and suggested further diagnostic procedures (see Appendix A). Conditions selected for the case studies were herpes gingivostomatitis, acute gout, infectious arthritis, acute dacryocystitis, congestive heart failure, acute otitis media, acute tonsillitis, and pre-cancerous oral leukoplakia (De Wet, 1997; South Africa, 1996; Muller, 1997). The selection of the conditions were divided into:

- Common acute minor ailments encountered in the clinics (otitis media, tonsillitis);
- acute minor ailments that are commonly confused with their differential diagnosis resulting in incorrect diagnosis and management (herpes gingivostomatitis, gout, dacryocystitis); and
- three serious conditions which are often confused with or treated as acute minor ailments and which needs recognition and immediate referral in order to ensure good primary health care practice and prevent serious complications (infectious arthritis, congestive heart failure and pre-cancerous oral leukoplakia).

The case studies were administered in a group situation. The participant read through the description on each case study and answers the four questions accordingly. The case studies were in a fill-in format. Although the researcher acknowledges that every primary health care nurse have the Essential Drugs Programme at their disposal in every clinic, the embedded knowledge enhanced by the training programme could only be assessed by not supplying the book to them. No time limit was imposed. The researcher gathered the completed case studies for evaluation.

A qualitative investigation was done on the case studies to determine medicine utilisation patterns in the prescribing of drugs e.g. correct protocol and diagnosis and the unnecessary prescribing of antibiotics. For the qualitative investigations themes were identified from the case studies (collectively by the panel of three evaluators. See Smith & Wertheimer, 1996:125), and counted accordingly. The following themes were used:

1. Correct protocol (Drug, dose and period of treatment) for specific condition.
2. Incorrect protocol - medication and management of specific condition.
3. Unnecessary medicine.
4. Sub-therapeutic doses.
5. Overdose.
6. Too short period of treatment.

7. Too long period of treatment.
8. Possible interaction between given drugs.
9. Mistreatment may have serious effects on a specific condition, e.g. Theophyllin in a patient with congestive heart failure and aspirin for the treatment of gout.
10. Symptomatic treatment only, resulting in possible complications, e.g. non-steroidal anti-inflammatory drugs (NSAIDs) for the treatment of gout without further investigation of the condition resulting in the risk of developing chronic gout.
11. Treatment on primary health care level not indicated, only on secondary level, e.g. digoxin – but provided on primary health care level.
12. Unnecessary expensive medication (Where cheaper medicine would work just as well e.g. amoxicillin vs. penicillin).
13. Unnecessary prescribing of antibiotics.
14. Treatment on primary health care level indicated but nothing provided.
15. Referral and no medication.
16. Inappropriate selection of an antimicrobial agent e.g. tetracycline for a child or penicillin for a fungus infection.
17. No advice is given which could positively improve the condition, e.g. dacrocystitis and gout.
18. Would be advisable to provide more medication in order to prevent complications e.g. paracetamol for fever or tetracycline eye ointment – None given.
19. Immediate (STAT) treatment and referral.
20. Good patient information and advice given.
21. Incorrect diagnosis
22. Correct diagnosis
23. Accidental management – Diagnosis incorrect, prescription will have positive effect on the condition.
24. Period of treatment not specified.
25. Unnecessary diagnostic tests performed.

The researcher and an expert in the field (Pharm.D pharmacist) did the evaluation of the prescribing outcomes and medicine utilisation of the case studies. The evaluation outcomes of each evaluator were statistically compared with each other in order to ensure interrater reliability. The intra-class coefficient was 0,99, which indicate a very good agreement between the evaluations of the two evaluators (Bland & Altman, 1986:307-310; Dunn, 1989:34-35).

The validity of the case studies was ensured by developing items on the basis of the important constructs, and by obtaining the opinions of experts regarding the constructs and items. The case studies were presented to experts (two

medical practitioners, two pharmacologists and two primary health care nurses) to determine face validity. A trial run was performed on primary health care nurses in primary health care clinics in the Potchefstroom district to ensure that the case studies were clearly understood and relevant.

## RESULTS

For the sake of this article only the tabulated results of the first case study (herpes gingivostomatitis) will be presented. The prescribing and medicine utilisation outcomes of the other seven case studies will, however, be summarised from the research.

### Case study 1 - Primary herpes gingivostomatitis

The presence of blisters, fever and lymphnodes differentiate the condition from ailments such as oral thrush. The condition is self-limiting and continues over a period of seven to ten days. Management includes symptomatic relief and good patient information. Complications such as dehydration may develop and should be addressed and explained to the mother. The correct management includes an anti-pyretic agent, e.g. paracetamol syrup, gentian and violet applications, oral rehydration/increased fluid intake, e.g. ice lollies, a soft diet, and no force feeding of the baby. Multivitamins may be given as supportive therapy. Antibiotic therapy has no value in the treatment of this condition (a virus), unless secondary infection is present, which is rare (Bannister *et al.*, 1996:79; Berkow *et al.*, 1992:202 & 2478; Tierney *et al.*, 1997:223). The results for this case study is presented in Table 1:

The results of the pre-tests indicate that only 14,29% of the experimental group were able to make the correct diagnosis (theme 22) while all the respondents in the control group made an incorrect diagnosis. The respondents of both groups who made an incorrect diagnosis suggested oral thrush and treated the condition accordingly with antimicrobials such as nystatin, miconazole gel and some even with amoxicillin (theme 13). Of the 14,29% in the experimental group only 8,57% were able to treat the condition rationally (theme 1). However, 14,29% of the experimental group and 16,13% of the control group suggested no treatment (theme 14) whatsoever. Inadequate advice (theme 17) and a lack of the provision of supportive medication (in this case for the treatment of fever) -

theme 18 - were also apparent during the pre-testing. The provision of unnecessary medication (theme 3) was also common in both groups.

During the post-testing it was found that there were a significant improvement in the experimental group towards the correct diagnosis (theme 22), 74,29% of the participants were able to make the diagnosis for primary herpes gingivostomatitis although only 60% applied the correct protocol. This change of 54,29% was statistical significant with a large practical significance. There was also a significant decrease in the provision of antimicrobials for the treatment of the condition (theme 13) and only 17,14% still provided antimicrobials. The percentage improvement towards the correct protocol was 54,29% which was statistical as well as practical (large effect) significant. The provision of good patient information (theme 20) also improved for the better with 34,29%.

The results for the control group stayed approximately the same during the pre and post testing, with no practical or statistical significant differences.

### Summary of the results of: Case study 2 - Acute gout

The essentials of diagnosis for acute gout include the acute nocturnal onset, inflammatory monarticular involvement of the first metatarsophalangeal joint and the dramatic therapeutic response to colchicine. A low-grade fever, support the diagnosis of acute gout. The condition is not self-limiting and may result in chronic gout with enormous cost implications. Management includes colchicine, which is only effective against gouty arthritis, has a rapid onset of action, is cheap and may be diagnostic for the condition, a short course of non-steroidal anti-inflammatory drugs, and good patient information and dietary advice. Serum uric acid should be measured which is necessary for further follow-up and preventative treatment (allopurinol). This condition is often confused with cellulitis, trauma and other arthritis conditions such as rheumatoid or osteoarthritis (Berkow *et al.*, 1992:1346-1349; South Africa, 1996:71; Tierney *et al.*, 1997:753-757).

During the pre-testing the respondents of both groups confused the clinical presentation with trauma or cellulitis. Only 17,41% of the experimental group made the correct diagnosis (theme 22) while only 2,86% of them were able to

1. Obtain tabulated results from the researcher. E-mail : rothmann@iafrica.com or Tel 018-2906866

**Table 1 : A comparison of the medicine utilisation in case study 1 between the pre and post-testing for the experimental and control group.**

THEME	PRE-TEST		POST-TEST		% Improvement		p	d
	EG (n=35)	CG (n=31)	EG (n=35)	CG (n=31)	EG (n=35)	CG (n=31)		
	%	%	%	%	%	%		
1	8,57	-	60,00	-	54,29	-	0,000**	1,87++
2	71,43	90,32	17,14	90,32	57,14	6,45	0,000**	1,52++
3	62,86	77,42	14,29	77,42	51,43	12,90	0,000**	1,16++
4	-	-	-	-	-	-	-	-
5	-	6,45	-	6,45	-	6,45	1,000	-
6	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-
12	5,71	48,39	8,57	48,39	5,71	9,68	0,983	-
13	71,43	77,42	17,14	77,42	54,29	12,90	0,000**	1,19++
14	14,29	16,13	-	16,13	14,29	12,90	0,340	-
15	-	-	-	-	-	-	-	-
16	-	12,90	-	12,90	-	6,45	1,000	-
17	42,86	71,97	42,86	71,97	20,00	3,23	0,000**	1,38++
18	28,57	16,13	20,00	16,13	25,71	3,23	0,000**	1,48++
19	-	-	-	-	-	-	-	-
20	20,00	3,23	48,57	3,23	34,29	3,23	0,000**	1,58++
21	85,71	100,00	25,71	100,00	60,00	-	0,000**	1,89++
22	14,29	-	74,29	-	60,00	-	0,000**	1,89++
23	2,86	-	2,86	-	2,86	-	0,690	-
24	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-

\*\* Difference is statistically significant :  $p \leq 0,01$

++ Difference is practically significant :  $d \geq 0,80$  (large effect)

apply the correct protocol (theme 1). The control group showed the same tendency. It was found that 34,29% of the experimental and 29,03% of the control group treated the condition with antimicrobials such as amoxicillin (theme 13) which may result in an enormous effect on cost and patient outcomes. Most of the respondents treated the condition only symptomatic (theme 10). This was true for 28,57% of the experimental group and 48,39% of the control group. The provision of patient ad-

vice (theme 20) was non-existent for both groups (only 8,57% of the experimental group and 12,9% of the control group provided information). During the pre-testing there were statistical and practical (large effect) significant improvement with in the experimental group towards the correct diagnosis (82,86%) and the application of the correct protocol (97,14%). The same was true for the provision of good patient information and advice, which improved with 60%. The results for the control

group were more or less the same as the results obtained from the pre-testing with no statistical significant improvement.

### Summary of the results of: Case study 3 - Infectious arthritis

The essentials of diagnosis for infectious arthritis include the sudden onset of acute arthritis that is monoarticular and in a large weight-bearing joint. There is a positive history of joint damage or recent

urethritis or haemorrhagic vesicular skin lesions. The presence of fever and signs of inflammation in the joint, support the diagnosis. The condition is a medical emergency and the joint may be destroyed if not promptly treated. Management includes immediate treatment with penicillin G or benzylpenicillin IMI and urgent referral to secondary level (Bannister *et al.*, 1996:339; Berkow *et al.*, 1992:1342-1343; Tierney *et al.*, 1997:790-791).

The result regarding the correct diagnosis and the management of the condition were catastrophic during the pre-testing. Only 8,57% of the experimental group and 9,86% of the control group were able to make the correct diagnosis, while none of them managed the condition correctly. Although 34,29% of the experimental group and 35,45% of the control group suggested immediate treatment (mostly non-steroidal anti-inflammatory drugs) supported by referral to secondary level.

During the post-testing, however, the experimental group improved significantly (statistical as well as practical) towards the correct diagnosis (88,57% improvement) and the application of the correct protocol (82,86% improvement). No statistical significant improvement was found for the control group.

#### Summary of the results of: Case study 4 - Acute dacryocystitis

Pain, redness and oedema about the lacrimal sac, epiphora, and conjunctivitis are essentials of diagnosis for this acute minor ailment. A dry nose and raised temperature are supportive signs for diagnosis. Management includes an oral antibiotic, such as amoxycillin, tetracycline eye ointment, paracetamol syrup, and oxymetazoline nasal drops. Patient information and advice should include the recommendation of hot compresses and massaging of the lacrimal system (from the nose upwards) after every feed. Complications such as chronic dacryocystitis or dacryostenosis may develop if not treated promptly (Berkow *et al.*, 1992:2376; Elkington & Khaw, 1988:7-8; Tierney *et al.*, 1997:178-179).

Only 17,14% of the experimental group and 22,85% of the control group were able to make the correct diagnosis during the pre-testing. Most of the respondents diagnosed the condition as a sty or bacterial conjunctivitis. None of the experimental group, who made a correct diagnosis, was able to manage the condition correctly while only 6,45% of the control group comply with the correct protocol. The provision of good advice

and information were also found to be inadequate. None of the experimental group and only 3,23% of the control group provided patient information or advice that could improve the condition.

On completion of the primary care drug therapy-training programme there was a 74,29% improvement within the experimental group towards the correct diagnosis and the same improvement towards the correct management of the condition. Also an improvement of 57,14% occurred towards the provision of good patient information and advice. All these results were statistical and practical significant (large effect). The results of the control group during the post-testing did not change with any significance.

#### Summary of the results of: Case study 5 - Congestive heart failure

The essentials of diagnosis for CHF include exertional dyspnoea, cough, rales, orthopnoea, tachycardia, hypotension, reduced pulse pressure, signs of increased sympathetic nervous system activity, e.g. cold extremities and diaphoresis, hepatomegaly, dependent oedema and elevated venous pressure. Support for the diagnosis includes the absence of dyspnoea during rest, a negative history regarding asthma or COPD and worsening of symptoms in the recumbent position. Management on PHC level includes immediate referral to secondary level for further investigation and the initiation of treatment and management. STAT treatment with a diuretic, e.g. hydrochlorothiazide is also regarded as correct (Berkow *et al.*, 1992:446-454; South Africa, 1996:48-49; Tierney *et al.*, 1997:387

The results during the pre-testing were distressful. Only 25,71% of the experimental group and 25,84% of the control group made the correct diagnosis, while only 14,29% and 12,9%, retrospectively, managed the condition correctly. The condition was overall confused with asthma, bronchitis or COPD. In the experimental group 34,29% of the respondents treated the condition with antibiotics and sent the patient home (the same was true for 19,39% of the control group). Theophyllin (which may aggravate the condition) as only treatment (theme 9), was supplied by 22,86% of the experimental group and 25,84% of the control group.

However, during the post-testing the experimental group improved significantly (statistically and practically) regarding all the above results. The improvement towards the correct diagnosis was 60% (85,71% were able to make the correct diagnosis) and the correct management

was 57,14% (68,57% managed the condition correct). Only 5,71% of the experimental group suggested theophyllin for the treatment of the condition. There were no statistical or practical significant differences within the control group.

#### Summary of the results of: Case study 6 - Acute otitis media

This case study represents acute otitis media (secondary to upper respiratory infection). Essentials of diagnosis include fever, red and bulging tympanic membrane, symptoms of upper respiratory infection, and nausea, vomiting and diarrhoea occur commonly in infants. Complications include rupture of tympanic membrane, acute mastoiditis, and meningitis. Suggested treatment is as follows: an antibiotic such as amoxycillin or cotrimoxazole and an antipyretic agent. Supportive treatment includes systemic or local sympathomimetic drugs, e.g. pseudoephedrine or oxymetazoline nasal drops (Berkow *et al.*, 1992:2331; South Africa, 1996:43; Tierney *et al.*, 1997:205-206).

The results of the pre-testing were much more satisfactory. 71,43% of the experimental group and 74,23% of control group were able to make the correct diagnosis although only 60% of the experimental group manage the condition correctly. The entire control group, who made the correct diagnosis, managed the condition correctly. However, 57,14% of the experimental group and 58,06% of the control group did not supply any supportive medication (theme 18) such as an antipyretic that would have improved patient comfort.

The primary care drug therapy-training programme added to a 25,71% improvement towards the correct diagnosis within the experimental group. During the post-testing 94,29% of the respondent were able to make the correct diagnosis and 91,43% applied the correct management protocol, thus an improvement of 34,29%. These results were both statistical and practical (large effect) significant. Although there were an improvement towards the provision of supportive medication the results were not significant. The results of the control group during the post-testing also did not improve significantly.

#### Summary of the results of: Case study 7 - Acute tonsillitis

Essentials of diagnosis include oedematous and hyperemic tonsils with purulent exudate, fever, and anterior lymphadenopathy. Complications such as rheumatic fever may occur. Penicillin is the

antibiotic of choice supported by an antipyretic agent and salt water gargles (Berkow *et al.*, 1992:2350; South Africa, 1996:53; Tierney *et al.*, 1997:223-225).

The outcomes of this case study were even better than in the otitis media case study. It was apparent that the nurses felt comfortable with this condition and 94,29% of the experimental group and 80,65% of the control group made the correct diagnosis although only 71% of both groups were able to treat the condition according to the correct protocol during the pre-testing. The primary care drug therapy-training programme contribute to a better application of the management protocol in the experimental group but the results were not statistical significance when compared to the control group.

### Summary of the results of: Case study 8 - Pre-cancerous oral leukoplakia

The condition is often confused with oral thrush but unlike oral thrush the white lesions cannot be removed with a spatula and the condition is painless. There is normally a positive history of heavy smoking especially pipe smoking. This condition should be referred immediately for further investigation. No treatment on PHC level can improve the condition but patient information and advice is recommended (Berkow *et al.*, 1992:2491; Tierney *et al.*, 1997:221-222).

The results of the pre-testing showed that only 22,86% of the experimental group and 16,01% of the control group were able to make the correct diagnosis. The entire experimental group who made the correct diagnosis managed the condition correctly while only 12,94% of the control group who made the correct diagnosis supplied the correct management. The condition was generally confused with oral thrush and treated with antimicrobials. The training programme contributed to a 62,86% improvement towards the correct diagnosis and a 31,34% improvement towards the correct management within the experimental group. These results were both statistical and practical (large effect) significant. The results of the control group did not improved with any significantly.

### DISCUSSION

The pre-training programme results (pre-tests of both groups and the post-tests of the control group) indicate that the groups were able to diagnose and treat common apparent conditions such as acute otitis media and acute tonsillitis satisfactorily. It was, however, evident that acute minor ailments such as her-

pes gingivostomatitis, acute gout, and acute dacrocystitis were confused with other common and more apparent ailments such as oral thrush, trauma, and a sty or bacterial conjunctivitis. The result is irrational management of these conditions, which may contribute to poor patient outcomes and escalating costs. Another concern regarding the outcomes of the pre-training programme results was that all three serious and life-threatening conditions (infectious arthritis, congestive heart failure, and pre-cancerous leukoplakia) were managed by most of the respondents as an acute minor ailment (trauma, asthma, and oral thrush). These serious conditions were in most cases not even mentioned as a possible differential diagnosis.

The post-test results of the experimental group indicated that there was a significant improvement towards the correct diagnosis and management of the conditions; there was a decrease in the unnecessary use of antibiotics; an improvement towards the rational provision of supportive medication; and a substantial improvement in the provision of good patient information and advice. These results were of statistical as well as of practical significance for all the case studies except acute otitis media and acute tonsillitis. In the latter there was an improvement but the condition was well managed before and after the training programme by most of the respondents.

The competency-based primary care drug therapy-training programme has proved to be successful and was perceived as such by the participants. The participants stated, in a reaction evaluation, that the most important learning experience was that they were able to make a connection between the diagnosis and treatment including the difference between serious and less serious and when to treat and when to refer. One participant summarised the success of the training programme as follows: "Theory and practice is well related - it is the reality of PHC and the common problems that we encounter and experience in PHC. Everyone of use cannot wait to go back and implement what we have gained."

### CONCLUSION

The pre-testing results of this research indicate that most of the nurses were able to diagnose and treat the two common acute minor ailments (acute otitis media and tonsillitis) rationally. A concern, however, is that the same is not true when confronted with the selected differential diagnoses for common acute minor ailments encountered daily in PHC

clinics. The primary care drug therapy-training programme, however, contributed significantly to the outcomes of the experimental group in this regard, resulting in the improvement of the following:

- the correct diagnosis;
- the application of the correct management protocol;
- a decrease in the unnecessary prescribing of antibiotics;
- a decrease in the mistreatment of conditions resulting in serious complications;
- the provision of good patient information and advice; and
- the rational and correct prescribing of necessary supportive medication such as an anti-pyretic.

Because the PHC nurse is for most patients the first line of health care, it is imperative that she/he should be able to differentiate between serious conditions that necessitates referral and less serious conditions that is manageable on PHC level in order to ensure positive patient outcomes. The researchers, therefore, recommend that more emphasis should be placed on the PHC management (diagnosis and treatment) of the differential diagnoses of acute minor ailments and serious conditions that may present as acute minor ailments during the training of PHC nurses. By achieving a high level of knowledge and skills in this regard, PHC services in South Africa will triumph as being comprehensive and excellence-driven.

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## REFERENCES

- ARNOLD, J., COOPER, C.L. & ROBERTSON, I.T. 1998.** Work Psychology: Understanding human behaviour in the workplace. 3<sup>rd</sup> ed. London: Financial Times Pitman Publishing.
- BANDURA, A. 1986.** Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, N.J. : Prentice Hall.
- BANDURA, A. 1997.** Self-efficacy in changing societies. Cambridge : Cambridge University Press.
- BANNISTER, B.A., BEGG, N.T. & GILLESPIE, S.H. 1996.** Infectious disease. Oxford: Blackwell Science.
- BARR, R.B. & TAGG, J. 1995.** From teaching to learning - a new paradigm for undergraduate education. *Change*, 27(6):13-25, Nov/Dec.
- BERKOW, R., FLETCHER, A.J., BONDY, P.K., DILTS, P.V., DOUGLAS, R.G., DROSSMAN, D.A., FALING, L.J., FRENKEL, E.P., HOEKELMAN, R.A., PLUM, F., ROMANO, J., ROSSI, G.V., & TANSER, P.H. 1992.** The Merck manual of diagnosis and therapy. 16<sup>th</sup> ed. Rahway, N.J.: Meck Research Laboratories.
- BLAND, J.M. & ALTMAN, D.G. 1986.** Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet*, 8:307-310, Feb.
- DALL'ALBA, G. & SANDBERG, J. 1996.** Educating for competence in professional practice. *Instructional science*, 24:411-437.
- DE WET, G. 1997.** Interview on 26 October 1997 (Notes are in possession of the researcher).
- DE WET, J.J., MONTEITH, J.L. DE K., VENTER, P.A., & STEYN, H.S. 1981.** Navorsingsmetodes in die opvoedkunde: 'n inleiding tot empiriese navorsing. Durban : Butterworth.
- DREYER, M.S. 1996.** Pharmacology for nurses and other health workers. Pretoria: Kagiso.
- DUNN, G. 1989.** Design and analysis of reliability studies. London: Edward Arnold.
- ELKINGTON, A.R., & KHAW, P.T. 1988.** ABC of eyes. London : British Medical Association.
- EVIAN, C. 1989.** What is our manpower policy in primary health care services? *Nursing RSA*, 4(11):36.
- HUYSAMEN, G.K. 1993.** Metodologie vir die sosiale en gedragswetenskappe. Halfweghuis : Southern.
- IRWIG, L.M., PORTER, B., WILSON, T.D., SAUNDERS, L.D., WAGSTAFF, L.A., LIESCH, N., REINACH, S.G., MAKHAYA, M.S., & GEAR, J.S.S. 1985.** Clinical competence of paediatric primary health care nurses in Soweto. *South African medical journal*, 67:92-95.
- KNOWLES, M.S. 1978.** The adult learner: a neglected species. 2<sup>nd</sup> ed. Houston: Gulf.
- MULLER, A. 1997.** Interview on 2 November 1997 (Notes are in possession of the researcher).
- OELOFSE, L. 1996.** Draft document: E.D.L. medication formulary for clinics. Rustenburg : Department of Health and Developmental Social Welfare North West Province.
- ROGERS, C.R. 1980.** A way of being. Boston, Mass. : Houghton Mifflin.
- ROGERS, C.R. 1983.** Freedom to learn for the 80's. Columbus, Oh. : Merrill.
- SAS INSTITUTE. INC. 1985.** SASR users guide: Statistics. 5<sup>th</sup> ed. Cary, N.C. : SAS institute Inc.
- SERFONTEIN, J.H.P. 1997.** Interview on 11 November 1997 (Notes are in possession of the researcher).
- SMITH, M.C. & WERTHEIMER, A.I. 1996.** Social and behavioral aspects of pharmaceutical care. New York: Pharmaceutical Products Press.
- SOUTH AFRICA. Department of Health. 1996.** Standard Treatment Guidelines and Essential Drugs List for South Africa. Pretoria: Department of Health.
- SOUTH AFRICA. Department of Health. 1997.** White paper for the transformation of the health system in South Africa. Notice 667-1997 no. 17910.
- TIERNEY, L.M., McPHEE, S.J. & PAPADAKIS, M.A. 1997.** Current medical diagnosis & treatment. 36<sup>th</sup> ed. London: Prentice-Hall.
- WORLD HEALTH ORGANISATION. 1995.** Guide to good prescribing: A practical manual. Geneva : WHO.



## Appendix A - Synopses of case studies

### CASE STUDY 1

This is an infant of 20 months. The mother brought him to the clinic because he has a fever and lesions inside his mouth. He does not want to eat or drink.

#### Clinical findings

- The infant is in obvious distress with dribbling of saliva.
- Temperature : 39°C.
- Lesions are oval, whitish vesicles covering the tongue, soft palate, gums and the inside of the lips.
- No skin rash.
- No notable dehydration.
- Enlargement of cervical nodes.

Colour picture

**Your diagnosis :**

**Possible differential diagnosis :**

**Suggested Treatment :** Indicate strength (e.g. 500mg/5ml), dose (e.g. 15ml tds) and period of treatment (e.g. 10 days) - and advice :

**Any further diagnostic procedures you would have done or suggested :**

### CASE STUDY 2

A middle-aged male patient complains of severe pain in his left foot and big toe. He was woken in the middle of the night and can not stand anything touching the joint.

#### Clinical findings

- Joint is swollen and exquisitely tender.
- The overlying skin is tense, warm and dusky red.
- No other joints are affected.
- Temperature : 38,6°C.
- No sore throat.
- No swollen nodes.

Colour picture

### CASE STUDY 3

A 12-year-old child was brought to the clinic complaining of severe pain in his right knee. He jumped over a fence two days ago and fell on his knee. It was not so sore then. The pain intensified after a day with swelling of the joint.

#### Clinical findings

- Acute pain and swelling of the joint.
- The joint is warm and red.
- The redness is localised around the knee.
- No other joints are affected.
- Temperature : 38,6°C.
- No skin rash.

Colour picture

### CASE STUDY 4

An 8-month-old infant presents in the clinic with a swelling on the lower lid of his left eye. The mother indicates that she bought eye ointment at the pharmacy but nothing seems to help. The eye is crusted together in the morning with a sticky yellow discharge. Sometimes it is worse. It's been going on for 6 weeks.

#### Clinical findings

- A painful red swelling to the nasal side of the lower lid of the left eye.
- There is an over flow of tears and when the baby cries there is no secretion from the nose.
- The conjunctiva appears red.
- On pressure, pus regurgitates from the swelling.
- Temperature : 37,9°C.
- No lymph nodes.
- Throat and ears appear normal.

Colour picture

## CASE STUDY 5

An elderly patient, 65-years, complains of "asthma" during exertion and exercise. He never suffered from asthma before and he wants something to relief the symptoms.

### Clinical findings

Colour picture

- No obvious discomfort during rest.
- Out of history : Chronic non-productive cough that worsens in the recumbent position and during exercise with dyspnoea.
- Blood pressure : 100/70.
- Pulse : 110/minute.
- No fever, no lymph nodes or skin rash.
- Cold hands and feet.
- Fine crepitations at lung basis with a slight expiratory wheeze.
- Slight tenderness in the right upper quadrant of the abdomen.
- Temperature : 36,8°C.

## CASE STUDY 6

A 9-month-old infant presents in the clinic with fever, vomiting and no appetite. The child is in obvious distress.

### Clinical findings

Colour picture

- Temperature : 39,3°C.
- Slightly red tonsils.
- Bulging red right eardrum.
- Runny and stuffy nose with impetigo lesions around the nose.
- Coarse cough with crepitations.
- Tonsillar (more prominent on the right side) and anterior cervical lymph nodes.
- No obvious skin rash.

## CASE STUDY 7

A 10-year-old child complaining of a severe sore throat, joint pains and headache. The symptoms started the day before and are worse today.

### Clinical findings

Colour picture

- Temperature : 39°C.
- Tonsils are enlarged, very red and dotted with patches of white exudate.
- Tonsillar and anterior cervical node enlargement.
- No nasal discharge or cough.
- Tympanic membrane of both ears is slightly red.
- No skin rash.

## CASE STUDY 8

A middle-aged man complains of white painless lesions on his tongue. It's been there for quite a while and he tried several times to remove it by brushing his tongue. It seems to get worse.

### Clinical findings

Colour picture

- Thick, white firmly attached patches that are slightly raised and sharply circumscribed - Can not be removed with a spatula.
- Normal throat and no enlarged lymph nodes.
- The man was a pipe smoker for 10 years.
- Temperature : 36,7°C.

