PRESCRIPTION WRITING PRACTICES OF OREGON NURSE PRACTITIONERS

by

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CHAPTER I

INTRODUCTION

The 1979 Oregon Legislature granted prescription writing privileges to nurse practitioners through HB-2806, codified in ORS 678.375 - .390 (see Appendix A). Increasing numbers of nurse practitioners are being authorized by the Nurse Practitioner Advisory Council to prescribe medications to their patients, adhering to protocol guidelines and prescribing from the approved drug formulary established for nurse practitioners with prescriptive privileges.

The state of Oregon is a pioneer in having legally authorized prescription writing privileges for nurse practitioners. The law governing these prescriptive privileges was quickly put into operation because of implementation deadlines in the wording of the law itself. As a result, this legislation is being looked to as a model by nurse practitioners in other states who are seeking efficient legislation for prescriptive privileges. The Administrative Rules and Regulations that govern nurse practitioner prescription writing (OARR 847-60-005 -020, see Appendix B) were completed and operational by early 1980. As of November, 1980, 78 nurse practitioners had been granted prescription writing privileges; 126 had been granted prescriptive privileges by June, 1981.

The Administrative Rules and Regulations governing nurse practitioner prescription writing are well defined, and include: 1) at least one year of nurse practitioner practice immediately prior to applying for prescriptive authority, and 2) 30 hours of pharmacology continuing education which includes content in prescription writing, drug selection,

drug interactions, information resources, and pharmacology relating to the applicant's specific scope of practice. Biennial recertification requires 25 additional hours of CE pharmacology in the specialty area of practice.

Studies relating to the independent prescription writing practices of nurse practitioners are not available, and thus very little is known about these practices. Since the passage of HB-2806, some concern has been expressed by members of the medical community that nurse practitioners with independent prescriptive privileges will prescribe drugs unnecessarily or inappropriately. Nurse practitioners, themselves, need documentation of their independent prescription writing practices in order to evaluate the effect of prescriptive privileges on patient care management, and to present factual information before those who might question the appropriateness of prescriptive privileges for nurse practitioners.

Statement of the Problem

Although the effectiveness and safety of nurse practitioner patient care is well documented in the literature, studies of prescription writing and drug management are limited to nurse practitioners prescribing via physician signature. Studies are not available that examine, evaluate, or compare the prescription writing practices of nurse practitioners who prescribe independently and those who prescribe via physician signature. Studies have not been done that examine Oregon nurse practitioners' prescription writing. Thus, little is known about the prescription writing practices of Oregon nurse practitioners.

The purpose of this study was to describe the prescription writing

practices of Oregon nurse practitioners, with particular interest in those who prescribe via prescriptive certification. Answers were sought to the following questions: 1) do nurse practitioners prescribe appropriately, 2) from how many different drug categories do nurse practitioners frequently prescribe, 3) for what health problem categories do nurse practitioners frequently prescribe , and 4) how many medications do nurse practitioners prescribe per patient?

Review of the Literature

The review of the literature covers the effectiveness of nurse practitioners in managing the diagnostic and treatment aspects of patient care, and then looks closely at drug management as a treatment modality. Drug management is considered a part of the treatment component in the studies reviewed here, although none of the studies deal with independent drug management practices of nurse practitioners with prescription writing privileges.

The chronology of nurse practitioner role development is apparent in the literature. Literature reported from 1960-1969 primarily set the stage for the practitioner role of today, while that from 1970-1974 focused on what the practitioner role in primary care should be. In 1975 the diverse nature of studies began to reflect growing maturity and role consolidation, seeking answers to questions about nurse practitioners and their practices; most of the studies cited here are from this period. Edmunds (1978) reported these chronological stages after reviewing 471 books, journals, and articles relating to nurse practitioners.

Effectiveness of Diagnosis and Treatment

The diagnostic and treatment components of managing patient care are among the expanded role functions of nurse practitioners, and as such have been given a good deal of attention by health professionals. An early study by Lewis and Resnick (1967) showed that the care provided by nurse practitioners was comparable to that provided by physicians. Two similar patient populations were examined, one receiving nurse practitioner care with physician backup, and the other receiving traditional physician care. Results showed that nurse practitioners delivered safe and effective patient care measured by treatment and outcome.

Ortman (1978) found no difference in the quality of care provided for 54 stable hypertensive patients when physicians and nurse practitioners were compared by chart audit. A post-test-only control group design looking at treatment according to minimal standards for hypertension was used to examine the differences in care. Physicians cared for the 28 control patients and nurse practitioners cared for 26 patients. All patients were seen twice by the provider within a three week interval. Numbers of medications prescribed and the appropriateness of prescription actions were not reported.

Brennan, Krishan, Nobrega, Labarthe, Timm, McGrath, Sheps, and Hunt (1979) reported the effectiveness of nurse practitioner operated hypertension clinics when compared to private physician hypertension care. Initial screening, treatment course, and follow-up of 120 confirmed hypertensive patients spanned two years. The patients treated at the nurse practitioner clinic showed greater improvement of hyper-

tension than did the patients treated by physicians. Improvement was measured by decrease in blood pressure. Although drug management was mentioned in the study, specific medications, numbers of drugs prescribed, and appropriateness of prescriptions were not reported.

Skills of physicians and non-physicians (35 nurse practitioners and 4 physician assistants) were found to be complementary in a study by Simborg, Starfield, and Hord (1978). A total of 1,369 patient encounters were examined by chart review in six primary care practices which utilized both physicians and nurse practitioners and/or physician assistants. The investigation found that while physicians and nurse practitioners both emphasize diagnosis in patient management, nurse practitioners paid greater attention to the patients' symptoms than did physicians. This was particularly evident on follow-up care when greater overall recognition of problems was evidenced on the chart records of patients seen by nurse practitioners, regardless of whether the initial visit had been with the nurse practitioner or physician. Similarly, nurse practitioners prescribed non-drug therapy to a greater degree than did physicians, both on initial and follow-up visits. No mention was made of the appropriateness of prescribed medications, nor of numbers of medications prescribed.

Three studies reported in 1974 (Flynn; Sackett, Spitzer, Gent & Roberts; Spitzer, Sackett, Sibley, Roberts, Gent, Kergin, Hackett, & Olynich) looked at the effectiveness of nurse practitioner (nurse clinicians in Flynn's study) diagnostic and treatment methods in terms of patient outcomes, and all found no differences between the patients cared for by nurse practitioners and those cared for by physicians.

Spitzer, et al. studied the care given 817 patients in 21,085 primary care encounters and found the effectiveness of diagnostic and treatment care to be similar between nurse practitioners and physicians. This was a randomized controlled clinical trial over a 1 year period in a large family practice clinic. All clinical activities were monitored and recorded on daysheet journals. Drug management and prescription writing were included in this study and will be dealt with separately. It is to be noted that prescription writing was by physician signature.

In a controlled clinical trial by Sackett et al., the health outcomes of 949 patients were studied. Patients were assigned at a 2:1 ratio to either physician care or nurse practitioner care in this 1 year controlled clinical trial. The nurse practitioners either totally managed each patient's office visit or requested consultation with their associated physicians. No differences were found in the health outcomes of patients cared for by either conventional physician care or nurse practitioner care. The results indicated that care given by nurse practitioners was effective and safe. No specific mention was made of the drug management practices of either group of providers.

In Flynn's study of a 1 year demonstration project comparing the effectiveness of service delivery between physicians and four nurse clinicians, both groups were found to give effective care. Sixty patients were randomly assigned at a 2:1 ratio to physician care and nurse clinician (with physician supervision) care. Time and motion studies were used to measure the efficiency of service delivery; additionally, patient interviews and patient record reviews were utilized for data collection. An interesting finding in this study was that patients of

nurse clinicians seemed to have a greater knowledge of their diseases, complications, special diets, exercises, and medications. Drug management was included in this study and will be dealt with separately.

Levine, Morlock, Mushlin, Shapiro, and Malitz (1976) analyzed the care provided by 10 physicians and 12 non-physicians in 828 patient encounters, and found that the non-physician providers at the study setting provided care of comparable quality to that delivered by physicians. Practice patterns and patient outcomes were studied and compared at an ambulatory care setting. The number of nurse practitioners and other non-physician providers was not reported, nor was there mention of prescription writing practices.

Komaroff, Sawayer, Flately, and Browne (1976) found quality of care to be comparable for 44 nurse practitioner managed patients and 30 physician managed patients in a hospital outpatient ambulatory care unit. Patient management of specific conditions was examined, including those patients with symptoms of the respiratory tract, urinary tract, or vaginal infections. Each provider group was studied for a 10 day period. The nurse practitioners cared for patients following established protocols. Prescription writing was by physician signature, and all were pre-written. No specific mention was made of numbers or appropriateness of medications prescribed.

Physicians employing nurse practitioners in the Virginia and greater Philadelphia areas gave excellent and at-least satisfactory ratings to the diagnostic and treatment tasks done regularly by the nurse practitioners, according to a study by Levine, Orr, Sheatsley, Lohr, and Brodie (1978). This research encompassed nurse practitioners, their employing physicians, and nurse practitioner treated patients. The 26

practice settings utilized 58 nurse practitioners and 46 physicians. Sixty-seven percent of the physicians noted an improvement in quality of patient care delivery since nurse practitioners had been associated with their practice settings. The nurse practitioners rated 50 diagnostic and treatment tasks as to frequency of use in their practice; physicians then rated nurse practitioner performance of those tasks. Although six of the tasks were related to drug management, they did not deal with appropriateness or numbers of prescribed drugs.

Chambers and West (1978a, 1978b) examined 16,879 patient encounters by six family nurse practitioners and found quality of care standards to have been maintained after the introduction of the family nurse practitioners. Only those family practice settings that included both nurse practitioners and physicians were included in the 3 year study period. Data sources included nurse practitioner daybooks, time-study sheets, and questionnaires; patient record audits were also utilized. Record audits showed adequate management of certain indicator conditions when compared to the adequacy rating for the physicians during the same time period. A randomized clinical trial at one of the settings (1978b) used an array of health-outcome measures and demonstrated that the family nurse practitioners provided effective and safe care. Drug management was a part of this study and is dealt with separately.

The above cited studies show nurse practitioners to be effective in patient care delivery. While most studies dealt with drug management in some manner, none dealt with prescription writing practices of nurse practitioners who have independent prescriptive privileges.

Drug Management

Prescription writing, while not new to nurse practitioners as a

treatment modality, has generally been limited to the physician signature method. This is reflected in the following studies which discuss drug management by nurse practitioners.

Spitzer et al. (1974) found no difference of statistical significance when comparing the adequacy of prescriptions written by nurse practitioners and physicians. Although 510 prescriptions were analyzed, the rating criteria was not identified. Adequate ratings were given to 75% of the physicians' prescriptions and 71% of the nurse practitioners' prescriptions. Numbers of medications prescribed per encounter were not mentioned.

Chambers and West (1978b) also found the drug management by nurse practitioners to be adequate when compared to the adequacy rating for physicians during the same time period. Family nurse practitioners were found to have prescribed only 456 medications in 1,852 encounters (approximately 24.6%). Although this study cited the total number of prescribed medications, it did not specify criteria for rating the adequacy of drug management.

In a randomized trial of 817 patients in a family practice clinic, Chaiton, Spitzer, Roberts, and Delmore (1976) found that prescribed use of tranquilizers and sedatives was significantly decreased for nurse practitioner patients when compared to physician patients during the same time period. The study focused on the effect of nurse practitioners on established patterns of drug use in a family practice setting. Patients were interviewed initially and again one year after being randomly assigned 2:1 to physician or nurse practitioner care. Use of drugs in all other categories remained the same. The study did not deal with appropriateness of drugs prescribed or of numbers of drugs

prescribed by either nurse practitioners or physicians.

Levine et al. (1978) found that nurse practitioners tend to prescribe fewer medications as their independence increases. Fifty-eight nurse practitioners were studied; those who consulted with physicians on a more regular basis showed an increase in medications prescribed for patients with acute and chronic illnesses. A corresponding decrease in medications prescribed for similar patients was found among nurse practitioners who practice with less physician consultation, thus with increased independence. Although this study identified trends in prescribing practices of more-independent versus less-independent nurse practitioners, it did not look at appropriateness of medications prescribed for specific patient problems.

Simborg et al. (1978) found that although nurse practitioners did prescribe medications, they prescribed more non-drug therapy than did physicians at both initial and follow-up visits. Again, no specifics were identified as to numbers or appropriateness of prescribed medications.

Repicky, Mendenhall, and Neville (1980) examined the professional activities of 341 nurse practitioners in ambulatory care practices and found that nurse practitioners prescribed systemic drugs for only 17.4% of their patients. This was a nationwide survey of nurse practitioners employed in general practice, family practice, and general internal medicine settings. Logs were maintained of patient care activities for a three day period. Special diets, exercises, and various types of counseling and education were received by the majority of patients. No mention was made of specific medications prescribed for specific acute or chronic health problems.

Prescott and Driscoll (1980) reviewed the literature comparing nurse practitioner and physician patient-care management (controlled studies dating back to 1967), and found that physicians ordered more medications for their patients than did nurse practitioners. Additionally, nurse practitioners were found to have ordered more non-drug therapy for their patients than did physicians. Appropriateness and numbers of medications prescribed were not discussed.

Chaiton et al. (1975) found no differences in frequency of consumer-use of prescribed or suggested drugs between patients of physicians and nurse practitioners. This study was concerned with the influence of health professionals on medicine-taking practices, and therefore did not look at actual prescribing practices. Patients (N = 817) were randomly assigned 2:1 to physician or nurse practitioner care; they were interviewed initially and again at the end of the one-year study period. The patients responded to questionnaires listing 10 drug categories, and were asked to identify drugs taken within the previous 48 hours. Contrary to the findings of other studies, highest drug use was for sedatives and tranquilizers; lowest use was for antibiotics. These findings were the same for patients of nurse practitioners and physicians. At the end of one year, a significant decrease was noted in the prescribed use of tranquilizers and sedatives for patients of nurse practitioners when compared to physicians' patients.

Antibiotics rank highest among the drugs most frequently prescribed by nurse practitioners. Chambers and West (1978b) reported that nearly half of the nurse practitioner prescriptions were for antibiotics, followed by miscellaneous cold-remedies and cardiovascular agents

(N = 456 prescriptions). Similarly, studies by Draye and Pesznecker (1979), Repicky et al. (1980), and Ward (1979) found that the most frequent foci of problems seen and treated by nurse practitioners were respiratory-related, followed closely by circulatory-related problems, and then by EENT and genitourinary problems.

Summary

Nurse practitioners have increased levels of responsibility in providing health care, and are providing a broad range of primary health care services. They function as associates and colleagues of physicians, and work collaboratively with other health care professionals as well. The literature reviewed consistently finds nurse practitioner diagnostic and treatment functions in primary care to be effective and safe. Additionally, the literature reveals that nurse practitioner drug-management is comparable to that of physicians. These findings correspond with literature reviews of controlled studies dating back to 1967 (Prescott & Driscoll, 1980; Sox, 1979) which compare nurse practitioner patient-care managment to that of physicians. Sox found that the quality of primary care given by nurse practitioners was indistinguishable from that given by physicians. Prescott and Driscoll found no significant differences between physicians and nurse practitioners in their recording of chief complaint, current medications, previous treatments, physical assessment findings, diagnoses, management, and amount and type of medication ordered.

Interesting trends appear in the literature comparing nurse practitioner and physician drug-management. Nurse practitioners tend to prescribe more non-drug therapy than do physicians, and physicians tend

to prescribe more drug therapy than nurse practitioners. Another trend is that the more independent the nurse practitioner, the fewer medications prescribed in patient-care delivery. Only two studies actually analyzed the adequacy of prescriptions written by nurse practitioners; when compared with prescriptions written by physicians, no differences of statistical significance were found.

The trend toward prescribing fewer medications with increased independence, plus a scope of practice that emphasizes preventive health care, strongly suggests the probability that nurse practitioners who have independent prescriptive privileges prescribe fewer medications than nurse practitioners who prescribe solely via physician signature. However, because there have been no studies reported that examine the independent drug-management practices of nurse practitioners with prescriptive privileges, factual information is unavailable. Such information is necessary in order to evaluate the impact that nurse practitioner prescription-writing legislation has had on health care. Because this legislation is so recent, a great deal of interest has been generated in Oregon and throughout the country as to its effectiveness.

Purpose of Study

The purpose of this study was to describe the prescription writing practices of Oregon nurse practitioners, with particular interest in those who prescribe via prescriptive certification. Answers were sought to the following questions: 1) do nurse practitioners prescribe appropriately?, 2) from how many different drug categories do nurse practitioners frequently prescribe?, 3) for what health problem categories do nurse practitioners frequently prescribe?, and 4) how many medications do nurse practitioners prescribe per patient?

Operational Definitions

1. Nurse practitioner: A registered nurse who has been certified by the appropriate state authority as qualified to practice in an expanded specialty role within the practice of nursing. Commonly abbreviated as NP. Certified by the State Board of Nursing in Oregon.
2. Nurse practitioner scope of practice: Provision of primary care within specialty area(s) of certification. Oregon certifies nurse practitioners in nine specialty areas: Adult Nurse Practitioner (ANP), Family Nurse Practitioner (FNP), Pediatric Nurse Practitioner (PNP), Certified Nurse Midwife (CNM), Women's Health Care Nurse Practitioner (WHCNP), Psych/Mental Health Nurse Practitioner (PMHNP), School Health Care Nurse Practitioner (SHCNP), College Health Care Nurse Practitioner (CHCNP), and Geriatric Nurse Practitioner (GNP).
3. Prescription writing privileges: Also called prescriptive privileges and prescriptive certification. Authorization granted in Oregon by the Nurse Practitioner Advisory Council; certification issued by the Oregon Board of Medical Examiners. Authorizes the independent prescribing of drugs specified in the nurse practitioner drug formulary, as well as OTC (over-the-counter) drugs and medical devices.
4. Physician signature prescription writing: Physician's signature must appear on the prescription. Method of drug management used by nurse practitioners not having prescription privileges. Used by Oregon nurse practitioners with prescriptive privileges when a drug has not been approved for inclusion in the nurse practitioner drug formulary.

5. Nurse practitioner drug formulary: The Nurse Practitioner's Prescription Privilege Formulary contains the prescription drugs most commonly prescribed by nurse practitioners in their practices. Includes drugs which may be dispensed, administered, or prescribed by Oregon nurse practitioners with independent prescription writing privileges. Established by the nurse practitioner advisory council and revised regularly by that council. (Revisions: August, 1980; February, 1981; August, 1981; February, 1982). Scope of practice guidelines were added August, 1981.
6. Prescribe: Dispense, administer, or order medication or medical devices by written or spoken word.
7. Medication action: Initiate, modify, refill or discontinue medication. Also called prescription action.

CHAPTER II

METHODS OF PROCEDURE

Introduction

Oregon recently enacted legislation authorizing the independent prescribing of drugs, limited by formulary and scope of practice, by qualified nurse practitioners. Because this legislation is so recent, and because nurse practitioners in other states are viewing it as model legislation, its effectiveness and impact on health care are being closely scrutinized. Studies documenting the independent prescriptive practices of nurse practitioners with prescriptive authority are not yet available, thus factual information is not available for evaluation. While the review of the literature finds that nurse practitioner drug management via physician signature is safe and effective, no studies are available of the independent prescriptive practices of nurse practitioners with prescription writing privileges. Legislators, nurse practitioners, and other health professionals need such documented information in order to objectively evaluate the effects and impact of these drug management practices.

The purpose of this study was to describe the prescription writing practices of Oregon nurse practitioners, with particular interest in NPs who prescribe via prescriptive certification. Answers were sought to the following questions: 1) do nurse practitioners prescribe appropriately, 2) from how many drug categories do individual nurse practitioners frequently prescribe, 3) for what health problem categories do nurse practitioners frequently prescribe, and 4) how many medications do nurse practitioners prescribe per patient?

Sample

The population sampled was Oregon nurse practitioners. Group A subjects were potentially all nurse practitioners (N = 125) with prescription writing privileges. Sixty-two participants responded and made up the Group A sample. Group B subjects were to have been an equal number of nurse practitioners who prescribe via physician signature, matched to Group A subjects by specialty category, and randomly selected from the entire nurse practitioner population (minus the nurse practitioners with prescriptive privileges). Four separate random selections and mailouts were done in an attempt to complete the Group B sample. However, the response was poor and the sample was considered complete with only N = 9 participants (two specialty categories were exhausted in the four mailouts). The directory of nurse practitioners with prescription writing privileges was obtained from the Oregon Board of Medical Examiners. The nurse practitioner directory was obtained from the Oregon State Board of Nursing.

Data Producing Instrument

A daily prescription log was designed for this study. It is an adaptation of a similar instrument in current use by the University of Washington Department of Community Health Care Systems in a study on the prescribing practices of nurses. The instrument was adapted for use in this study using input from a panel of four Oregon nurse practitioners who had participated in the University of Washington study. The self-reporting prescription log sought information on each patient encounter involving drug management for 10 consecutive clinical days; each entry took the practitioner approximately one minute to complete, and included prescription information, client information, and related nurse practi-

tioner action. The data instrument, plus consent-cover letter and instruction sheet, were reviewed by the panel of nurse practitioners. Comments and suggestions were incorporated into the final version. See Appendix C, Data Instruments.

Research Design

This study was designed to be a descriptive survey. This design is appropriate when the intent is to describe characteristics or practices of the population under study. The intent of this study was to describe prescription writing practices of nurse practitioners. Variables were not manipulated.

Method

In December, 1980, all Oregon NPs with prescriptive privileges (N = 78) were invited to participate in the study. The Oregon Nurses' Association Nurse Practitioner Special Interest Group offered their assistance, and coordinated the mailout of cover letter, instruments and directions for participation. Interested participants returned the completed prescription logs to the ONA office; these logs were turned over to the researcher and became Group A subjects. By June, 1981, an additional 47 nurse practitioners had become certified for prescription writing privileges. This group was invited to participate in this study, and were to indicate their willingness to participate by returning a postcard to the researcher. The number of intended participants was then added to the Group A sample. This revised sample served as the basis for determining the size of the Group B sample, nurse practitioners who prescribe via physician signature.

Random selection using a random numbers table, of Group B subjects, was within specific categories matched to the Group A sample. Four

separate mailouts were done, each with random selection as before, in an attempt to match Group B with the Group A sample. Poor response and the exhaustion of two specialty categories caused the sample to be considered complete without matching Group B to Group A. The final total of Group A subjects was N = 62, and of Group B subjects was N = 10.

As the completed instruments were returned, identification numbers were assigned. A list was compiled of all drugs prescribed, and the prescribing guidelines for each drug were obtained from one or more of the four drug resources utilized (United States Pharmacopeia Dispensing Information, American Hospital Formulary Service, Facts and Comparisons, Handbook of Common Over the Counter Drugs).

Each prescription action was then subjected to predetermined criteria (see Appendix D, Tool to Determine if Drugs Appropriate or Inappropriate) to determine whether the medication action was appropriate or inappropriate. Criteria included correct dosage, indications for use, contraindications, and provider signature (NP or NP with MD signature). Nurse practitioners with prescriptive privileges had to adhere to the NP drug formulary guidelines; drugs not approved for formulary use required a physician's signature. Nurse practitioners without prescriptive privileges required physician signatures on all prescription actions.

The data were then tabulated and analyzed. The chronology of the study is outlined below, and identifies the steps taken to gather and compile the data.

Chronology

1. December, 1980, mailing to entire group of nurse practitioners with prescriptive privileges, Group A subjects. Mailout assistance per

ONA NPSIG to initial N = 78; completed instruments returned to ONA headquarters and turned over to researcher.

2. June, 1981, Group A expanded. Forty-seven additional nurse practitioners who had been granted prescriptive privileges were mailed instruments and invited to participate in the study. Postcard response was requested regarding: 1) intent to participate, and 2) specialty area of practice.
3. July-August, 1981, random selection and mailing to Group B subjects, matched by specialty area to Group A subjects. Four separate mail-outs in an attempt to match samples.
4. Completed instruments given identification numbers on return. Group A (N = 62), 100 - 299; Group B (N = 10), 300 - 399.
5. September, 1981, list compiled of all drugs prescribed.
6. October-November, 1981, guidelines for prescribing were obtained from drug resource references.
7. December, 1981, each prescription action rated appropriate or inappropriate, using tool with predetermined criteria.
8. January, 1982, per statistician guidelines, data for each nurse practitioner summarized, coded, and keypunched.
9. February-March, 1982, computer tabulation and analysis of data.

Analysis of Data

Data were analyzed to determine whether nurse practitioners prescribe appropriately, how many drug categories nurse practitioners prescribe from, and the health problems for which nurse practitioners frequently prescribe. Additional analyses determined the drug categories most frequently prescribed from and the number of medications prescribed

to patients. Due to the small Group B response, comparison between Groups A and B was not done.

Frequencies and measurements of central tendency were calculated for the variables. Statistical tests (ANOVA) were done to determine if significant differences existed between and among Group A specialty areas for two variables, drug categories and health problems.

CHAPTER III

RESULTS

Introduction

In order to describe the prescription writing practices of Oregon nurse practitioners, 256 nurses were invited to participate in a study seeking information on medication actions initiated by them over a period of ten clinical days. The original intent of the study was to compare the prescriptive practices of nurse practitioners with prescription writing privileges with those of nurse practitioners who prescribe via physician signature. However, because the response rate from the latter group was so poor after four separate mailouts, the groups remained unmatched. Findings are reported for the entire sample and separately for nurse practitioners with prescriptive privileges.

Sample

Sixty-three prescription logs were returned. Of those, two were incomplete, making them inappropriate for use in the study. Sixty-one prescription logs were complete, becoming the basis for the study's findings.

Of the total number of useable logs, 52 were from Group A, nurse practitioners who prescribe independently. Initial inquiry was sent to all nurse practitioners with prescriptive privileges (N = 125). Of the N = 57 who indicated their practice settings were conducive to such a study and would participate, 92.98% actually returned completed instruments (N = 53). One log was discarded as containing too little information to be of use in the study.

Nine of the total number of useable logs were from Group B, nurse practitioners who prescribe via physician signature. Initial inquiry

was sent to 126 nurse practitioners in four separate mailouts in an attempt to match the sample with the Group A sample. Of the N = 12 who indicated willingness to participate, 83.33% (N = 10) actually returned completed logs. One log was discarded as containing too little information to be of use in the study.

Table 1.1 shows the sample breakdown according to nurse practitioner specialty area.

Table 1.1 Nurse Practitioners Participating in Study by Specialty Area of Certification.

Specialty	Total NPs N = 61	Group A N = 52	Group B N = 9
WHCNP	20 (32.79%)	17 (32.69%)	3 (33.33%)
FNP	15 (24.64%)	11 (21.15%)	4 (44.44%)
ANP	9 (14.75%)	7 (13.46%)	2 (22.22%)
PNP	9 (14.75%)	9 (17.31%)	0
PMHNP	4 (6.5%)	4 (7.69%)	0
CNM	3 (4.92%)	3 (5.77%)	0
CNM/PNP	1 (1.64%)	1 (1.92%)	0

(Percent of total in parentheses)

Findings are reported for the entire sample and for Groups A and B separately. Comparisons are not made between Groups A and B because of the small N = 9 for Group B. Group A findings are analyzed in terms of nurse practitioner specialty areas and comparisons are made between categories. Findings for the CNM/PNP (N = 1) are not reported separately in order that anonymity be protected.

Appropriateness of Prescription Actions

A total of 4066 prescription actions were recorded by the 61 nurse practitioners over $\bar{x}$ = 9.74 days; 97.88% were rated appropriate. Each nurse practitioner initiated $\bar{x}$ = 66.66 medication actions of which

$\bar{x}$ 98.0% were appropriate.

Of the 3394 prescription actions by the 52 nurse practitioners in Group A over $\bar{x}$ = 9.73 days, 98.0% were rated appropriate. Each nurse practitioner initiated $\bar{x}$ = 68.71 medication actions of which $\bar{x}$ = 98.71 were appropriate.

Of the 672 prescription actions by the nine nurse practitioners in Group B over $\bar{x}$ = 9.71 days, 94.20% were rated appropriate. Each nurse practitioner initiated $\bar{x}$ = 54.78 medication actions of which $\bar{x}$ = 94.02% were appropriate.

Table 2.1 shows the number of prescription actions and the percentage rated appropriate for the total sample and for Groups A and B during the study period.

Table 2.1 Number and Percentage of Appropriate Prescription Actions

	Total NPs N = 61	Group A N = 52	Group B N = 9
Total Number Medication Actions	4066	3394	672
Percent Appropriate	97.88	98	94.20
Mean Number Days	9.74	9.73	9.71

Table 2.2 shows the number of prescription actions for Group A nurse practitioners by specialty area.

Table 2.2 Prescription Actions by Nurse Practitioners with Prescriptive Privileges

Specialty		Total Medication Actions	Percent Appropriate
ANP	(N = 7)	514	98.64
CNM	(N = 3)	163	100
FNP	(N = 11)	925	96.97
WHCNP	(N = 17)	1218	99.43
PMHNP	(N = 4)	353	98.87
PNP	(N = 9)	383	99.48

Table 2.3 shows the average number of prescription actions per nurse practitioner and the percentage rated appropriate. Table 2.4 shows the same information for Group A specialty areas.

Table 2.3 Prescription Actions Per Nurse Practitioner

	Total NPs N = 61	Group A N = 52	Group B N = 9
Number Rx Actions	66.66	68.71	54.78
Percent Appropriate	98.0	98.71	94.02
Number of Days	9.74	9.73	9.71

(Reported in $\bar{x}$ = mean)

Table 2.4 Group A Prescription Actions Per Nurse Practitioner

Specialty		Number Rx Actions	Percent Appropriate	Number of days
FNP	(N = 11)	84.09	97.31	9.36
ANP	(N = 7)	73.43	98.40	10.14
WHCNP	(N = 17)	71.65	99.27	9.77
CNM	(N = 3)	54.33	100.0	10.67
PNP	(N = 9)	42.56	99.57	9.44
PMHNP	(N = 4)	88.25	98.98	10.0

(Reported in $\bar{x}$ = mean)

Number of Drug Categories Prescribed

Nurse practitioners in the study prescribed from 19 different drug categories during the study period, with an average of $\bar{x}$ = 7.0 per NP. Group A nurse practitioners prescribed from 19 different drug categories, with an average of $\bar{x}$ = 6.83 per NP. Group B nurse practitioners prescribed from 15 different drug categories, with an average of $\bar{x}$ = 8.0 per NP (3.68, range 4-14).

Table 3.1 shows the number of different drug categories prescribed per nurse practitioner.

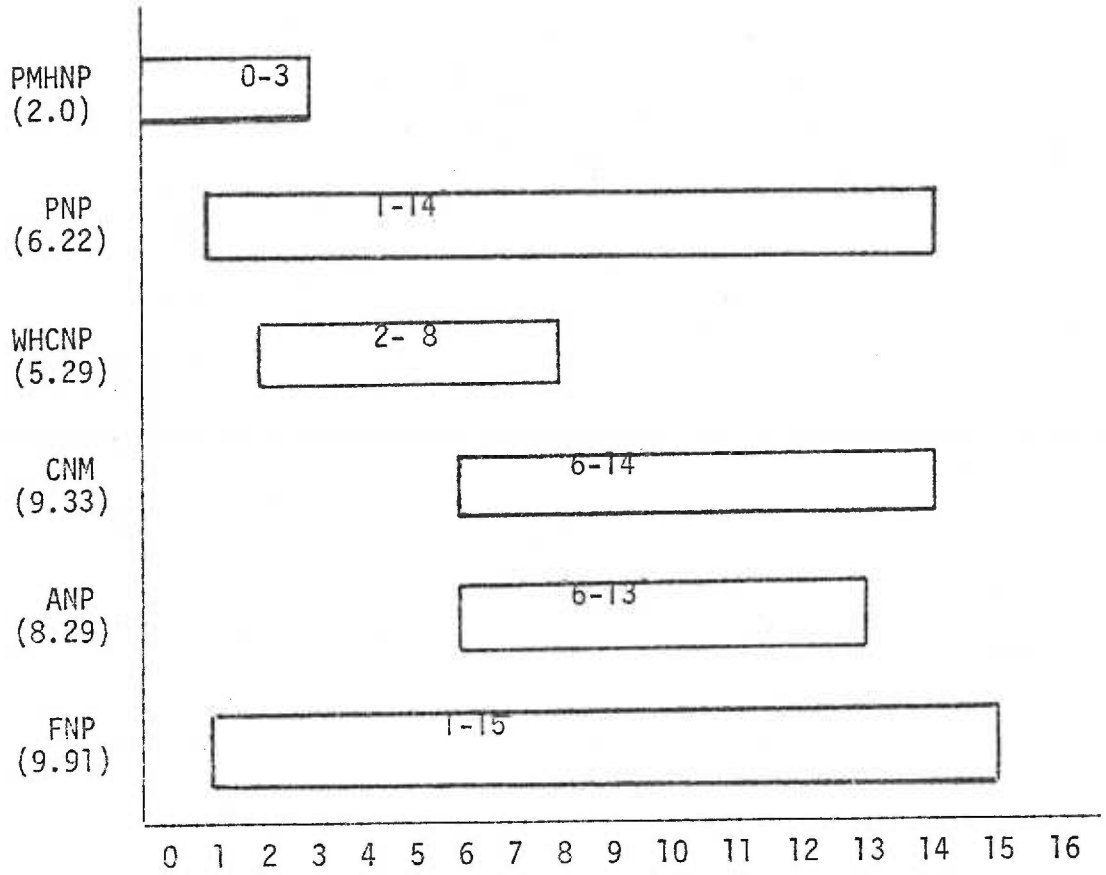
Table 3.1 Number of Different Drug Categories Prescribed Per Nurse Practitioner.

	Median	Mean	Range	Standard Deviation
Total Sample (N = 61)	6.35	7.0	0-15	3.77
Group A (N = 52)	6.38	6.83	0-15	3.80
Group B (N = 9)	6.25	8.0	4-14	3.68

Among Group A nurse practitioners, FNPs prescribed from the largest number of drug categories ($\bar{x}$ = 9.91), followed by CNMs ($\bar{x}$ = 9.33) and ANPs ($\bar{x}$ = 8.29). PNPs prescribed from $\bar{x}$ = 6.22 drug categories, WHCNPs $\bar{x}$ = 5.29, and PMHNPs $\bar{x}$ = 2.0.

Table 3.2 graphically depicts the range of drug categories prescribed by each of the specialty areas.

Table 3.2 Range of Drug Categories Prescribed by Group A Nurse Practitioners. (Mean number of drug categories prescribed is in parenthesis below each specialty).



Frequently Prescribed Drug Categories

The drug category most frequently prescribed by the total sample was hormones/synthetic substitutes ($\bar{x}$ = 16.66) followed by anti-infectives ($\bar{x}$ = 12.02) second, and CNS drug third ($\bar{x}$ = 9.72). Group A nurse practitioners prescribed the hormone/synthetic substitute category most frequently ($\bar{x}$ = 17.64), followed by anti-infectives second ($\bar{x}$ = 12.10), and CNS drugs third ($\bar{x}$ = 10.08, Md = 2.5). Group B prescribed anti-infectives ($\bar{x}$ = 11.56) and hormones/synthetic substitutes ($\bar{x}$ = 11.0) most frequently, followed by CNS drugs ($\bar{x}$ = 7.67, Md = 2.0) second.

Table 4.1 shows the frequency each drug category is prescribed by Group A specialty categories.

Table 4.1 Group A Drug Category Frequencies and Significant Differences

Drug Category	1 ANP (N=7)	2 CNM (N=3)	3 FNP (N=11)	4 WHCNP (N=17)	5 PMHNP (N=9)	6 PNP (N=9)	Overall F from ANOVA F(6,45) =	Significance (p <.05) Pairwise Comparison
Antihistamines	3.29 (4.68)	1.00 (1.00)	4.36 (5.50)	1.47 (3.18)	1.75 (1.71)	.33 (.50)	1.35	
Anti-infectives	14.86 (15.33)	2.33 (1.53)	19.73 (14.49)	11.59 (7.91)	.00 (.00)	11.22 (15.35)	1.94	
Autonomic Drugs	4.14 (4.85)	.33 (.58)	7.82 (8.29)	.29 (.59)	17.24 (20.12)	3.57 (1.19)	4.14**	5 >1,2,3,4,6
Blood Derivatives	.00 (.00)	.33 (.58)	.09 (.30)	.00 (.00)	.00 (.00)	.00 (.00)	1.65	
Iron Preparations	.00 (.00)	6.0 (2.65)	1.45 (3.30)	1.59 (2.37)	.00 (.00)	.22 (.00)	3.37	2 >1,3,4,5,6
Cardiovascular	2.00 (2.38)	.00 (.00)	3.27 (7.50)	.18 (.73)	.00 (.00)	.00 (.00)	1.15	
Central Nervous System Drugs.	10.57 (10.10)	7.00 (8.72)	9.73 (10.65)	2.06 (2.73)	69.00 (64.25)	1.00 (1.41)	8.23***	5 >1,2,3,4,6
Diagnostic Agents	1.00 (2.65)	.33 (.58)	.00 (.00)	.00 (.00)	.00 (.00)	1.00 (1.80)	1.18	
Electrolyte, Caloric and Water Balance	4.00 (4.36)	.67 (1.15)	6.18 (14.03)	.82 (1.07)	.00 (.00)	.22 (.67)	1.05	
Expectorants and Cough Preparations	4.29 (8.10)	.33 (.58)	2.36 (3.67)	.41 (1.23)	.00 (.00)	.33 (.71)	1.45	
Ear, Nose, Throat Topicals	4.00 (8.41)	.33 (.58)	3.27 (2.80)	.06 (.24)	.00 (.00)	1.78 (2.77)	1.72	
Gastrointestinal	1.29 (1.80)	2.00 (3.46)	.73 (1.19)	.47 (1.07)	.00 (.00)	.22 (.67)	1.20	
Hormones, Synthetic Substitutes	15.71 (8.96)	13.33 (9.50)	12.55 (13.36)	36.00 (20.25)	.00 (.00)	1.33 (2.69)	8.19***	4 >1,2,3,5,6
Oxytocics	.00 (.00)	3.33 (3.06)	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	12.86***	2 >1,3,4,5,6
Serums, Toxoids, Vaccines	.43 (1.13)	.33 (.58)	1.27 (2.20)	.00 (.00)	.00 (.00)	7.67 (11.90)	2.54*	6 >4
Skin, Mucous Membrane Preparations	2.43 (3.51)	.33 (.58)	3.09 (3.21)	.71 (1.21)	.00 (.00)	1.89 (2.26)	1.90	
Theophyllines	.29 (.76)	.00 (.00)	.91 (1.22)	.00 (.00)	.00 (.00)	.11 (.33)	2.55*	
Vitamins	.00 (.00)	11.67 (5.51)	2.18 (3.49)	2.53 (4.60)	.00 (.00)	1.22 (2.39)	4.41**	2 >1,3,4,5,6
Unclassified Therapeutics	.00 (.00)	.00 (.00)	.91 (1.14)	.41 (1.70)	.00 (.00)	9.00 (9.91)	4.94**	6 >1,2,3,4,5

* p <.05

** p <.01

*** p <.001

Table entries for each specialty area are $\bar{x}$ with SD in parenthesis beneath its respective $\bar{x}$.

ANOVA of Frequency of Prescribing Drug Categories

One-way analysis of variance (ANOVA) were computed to compare the six Group A specialty areas on the frequency of prescribing each of 19 drug categories. For these significant ANOVAs, the Neuman-Keuls post-hoc-test procedure was employed to compare all possible pairs of groups. A summary of the significant ($p < .05$) findings from the Neuman-Keuls procedure are described as follows.

PMHNPs (N = 4) prescribed two drug categories, CNS drugs and autonomic drugs, significantly greater than other specialty areas. The mean for CNS drugs prescribed by PMHNPs was 69.0, while the highest mean for any of the other groups was 10.57. The mean for autonomic drugs was 17.25, while the highest mean for other groups was 7.82.

CNMs (N = 3) prescribed three drug categories, iron replacements, vitamins, and oxytocics, at a significantly greater frequency than other practitioner groups. The mean for iron replacement drugs was 6.0, while the highest mean for other practitioner groups was 1.59. The mean for vitamins was 11.67, while the highest mean for other groups was 2.53. The mean for oxytocics was 3.33; no other practitioner group prescribed from this category.

WHCNPs (N = 17) prescribed one drug category, hormones/synthetic substitutes, significantly more frequently than other practitioner groups. The mean was 36.0, while the highest mean for other groups was 15.71.

PNPs (N = 9) prescribed two categories, serums/toxoids/vaccines

and unclassified therapeutics, significantly more frequently than other practitioner groups. The PNP mean for serums/toxoids/vaccines was 7.67, while the highest mean for the other groups was 1.27. The PNP mean for unclassified therapeutic agents was 9.0, while the highest for the other groups was .91.

Table 4.1 shows the significant differences (ANOVA, $p < .05$) for drug categories prescribed by Group A specialties.

Health Problem Categories for Which Medications are Frequently Prescribed

The total sample most frequently prescribed for preventive/health supervision ($\bar{x} = 20.53$), followed second by disorders of the genitourinary system ($\bar{x} = 13.46$), and third by skin and cellular tissue problems ($\bar{x} = 3.33$) and circulatory problems ($\bar{x} = 3.13$). Group A prescribed most often for preventive/health supervision ($\bar{x} = 22.27$), second for genitourinary problems ($\bar{x} = 14.08$), and third for skin and cellular problems ($\bar{x} = 2.80$). Group B also prescribed most frequently for preventive/health supervision ($\bar{x} = 10.44$), second for genitourinary problems ($\bar{x} = 9.89$), and third for skin and cellular problems ($\bar{x} = 6.33$, $Md = 2.0$).

Table 5.1 shows the frequency each health problem category was prescribed for by Group A nurse practitioners.

ANOVA of Group A Health Problem Categories

One-way analysis of variance (ANOVA) were computed to compare the six Group A specialty areas on the frequency of prescribing for each of 19 health problem categories. Differences among specialty areas appeared for six health problem categories. For these significant ANOVAs, the Neuman-Keuls post-hoc-test procedure was employed to compare all possible pairs of groups. A summary of the significant ($p < .05$) findings

Table 5.1 Group A Health Problem Frequencies and Significant Differences

Health Problem Category	1 ANP (N=7)	2 CNM (N=3)	3 FNP (N=11)	4 WHCNP (N=17)	5 PMHNP (N=4)	6 PNP (N=9)	Overall F from ANOVA F(5,45)=	Significance (p <.05) Pairwise Comparison
Infective/Parasitic Diseases	1.43 (1.51)	.00 (.00)	2.55 (3.80)	.88 (1.96)	.25 (.50)	1.4 (1.94)	1.07	
Neoplasms	.00 (.00)	.00 (.00)	.09 (.30)	.06 (.24)	.00 (.00)	.00 (.00)	.35	
Endocrine, Nutritional, Metabolic	11.57 (12.91)	.00 (.00)	2.09 (5.05)	.00 (.00)	.00 (.00)	.00 (.00)	5.55***	1> 2,3,4,5,6
Diseases of Blood, Blood Forming Organs	.00 (.00)	2.33 (2.31)	.36 (.67)	.24 (.97)	.00 (.00)	.44 (.88)	3.31*	2> 1,3,4,5,6
Personality, Psychoneuroses, Mental	3.29 (4.03)	.33 (.58)	1.82 (2.56)	.24 (.97)	87.75 (85.97)	.00 (.00)	11.19****	5> 1,2,3,4,6
Diseases of the Nervous System	3.57 (8.16)	.00 (.00)	.64 (.92)	.00 (.00)	.25 (.50)	.00 (.00)	1.60	
Eye	.71 (1.25)	.00 (.00)	2.09 (2.26)	.00 (.00)	.00 (.00)	1.22 (2.28)	3.12*	
Ear	5.43 (10.16)	.33 (.58)	7.82 (9.09)	.12 (.49)	.00 (.00)	10.11 (14.90)	2.42	
Circulatory System	5.43 (5.68)	1.0 (1.73)	9.0 (24.95)	.06 (.24)	.00 (.00)	.11 (.33)	.99	
Respiratory System	13.71 (20.20)	1.0 (1.73)	17.91 (19.13)	.82 (1.81)	.00 (.00)	2.33 (3.24)	3.97**	
Digestive System	1.43 (1.40)	.67 (1.15)	2.18 (3.16)	.12 (.49)	.00 (.00)	.11 (.33)	2.92*	
Genitourinary	14.71 (13.39)	5.33 (5.51)	12.36 (9.04)	27.76 (15.61)	.00 (.00)	.44 (.73)	9.09***	4> 1,2,3,5,6
Complications of Pregnancy, Parturition, Puerperium	.00 (.00)	3.33 (5.77)	.45 (.82)	1.24 (2.28)	.00 (.00)	.00 (.00)	2.08	
Skin/Cellular Tissue	3.57 (3.87)	.33 (.58)	4.82 (4.49)	.65 (1.06)	.00 (.00)	6.0 (4.69)	4.99**	6> 5
Musculoskeletal/ Connective Tissue	2.57 (3.20)	.00 (.00)	5.91 (6.79)	.12 (.49)	.00 (.00)	.00 (.00)	4.94**	
Injuries/Adverse Effects	.71 (1.50)	.00 (.00)	.82 (.87)	.00 (.00)	.00 (.00)	.22 (.44)	2.53*	
Preventive/Health Supervision	3.14 (4.49)	39.67 (19.86)	13.09 (15.52)	39.35 (21.59)	.00 (.00)	16.89 (16.83)	7.89***	2,4> 1,5
Social/Marital/ Family Problems	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)		
No Problem	.14 (.38)	.00 (.00)	.09 (.30)	.06 (.24)	.00 (.00)	.00 (.00)	.39	

Table entries for each specialty are mean; standard deviation in parenthesis beneath its respective mean.

* p <.05
** p <.01
*** p <.001

from the Neuman-Keuls procedures are described as follows.

ANPs prescribed medication for endorine/nutritional/metabolic problems significantly more frequently than did the other NP groups. The ANP mean for this health problem category was 11.57, while the highest (and only) mean amongst the other groups was 2.09.

CNMs prescribed for problems of the blood/blood forming organs significantly more frequently than did other NP groups. The CNM mean for this category was 2.33, while the highest mean among the other groups was .44.

PMHNPs prescribed for mental health problems significantly more frequently than other groups. The PMHNP mean for this category was 87.75, while the highest mean among the other groups was 3.29.

WHCNPs prescribed for genitourinary problems significantly more frequently than the other NP groups. The WHCNP mean for this health problem was 27.76, while the highest mean among the other groups was 14.71.

PNPs prescribed for skin and cellular tissue problems significantly more frequently than did PMHNPs. The PNP mean was 6.0, while the PMHNP mean was 0.

CNMs and WHNCPs prescribed for preventive/health supervision related matters significantly more frequently than ANPs and PMHNPs. The mean for CNMs was 39.67, and for WHNCPs was 39.39, while the mean for ANPs was 3.14 and for PMHNPs was 0.

Table 5.1 lists the significant differences (ANOVA, $p < .05$) among Group A specialties in prescribing for each health problem category.

Number of Different Drugs Prescribed

Nurse practitioners prescribed $\bar{x}$ = 20.28 different drugs during the study period. Group A prescribed $\bar{x}$ = 19.69 different drugs, and Group B prescribed $\bar{x}$ = 23.67 different drugs.

Table 6.1 shows the average number of different drugs prescribed by nurse practitioners during the study period.

Table 6.1 Number of Different Drugs Prescribed

	Mode	Median	Mean	Range	Standard Deviation
Total NPs (N = 61)	13	15	20.28	0-74	14.83
Group A (N = 52)	13	15.5	19.69	0-74	14.58
Group B (N = 9)	12	14	23.67	7-57	16.69

Group A. FNPs prescribed the largest number of different drugs during the study period ($\bar{x}$ 32.46), followed closely by ANPs ($\bar{x}$ 27.14). Next were CNMs ($\bar{x}$ 19.33), PMHNPs ($\bar{x}$ = 14.5) and WHCNPs ($\bar{x}$ = 14.47) and then PNPs ($\bar{x}$ = 11.78).

Table 6.2 shows the number of different drugs prescribed by Group A nurse practitioners.

Table 6.2 Number of Different Drugs Prescribed by Group A

Specialty	Median	Mean	Range	Standard Deviation
ANP (N = 7)	26.0	27.14	15-42	10.38
CNM (N = 3)	16.0	19.33	11-31	10.41
FNP (N = 11)	29.0	32.46	1-74	21.95
WHCNP (N = 17)	13.20	14.47	5-32	6.17
PMHNP (N = 4)	16.0	14.5	0-24	10.50
PNP (N = 9)	9.0	11.78	3-34	9.90

Number of Medications Per Patient

Two values were determined. The number of medications prescribed per total patients seen, and the number of medications prescribed per patient receiving prescription action.

Nurse practitioners in the study prescribed $\bar{x}$ = .67 medication actions per total patients, and $\bar{x}$ = 1.30 per patient for whom medications were prescribed. $\bar{x}$ = 50.13% of the total patients seen per nurse practitioner were prescribed at least one medication.

Table 7.1 shows the number of medications prescribed per patient by all nurse practitioners during the study period, and for Groups A and B. Table 7.2 is a summary of the number of medications prescribed per patient by Group A nurse practitioners specialties.

Table 7.1 Medications Prescribed Per Patient

	Rx (Total) Patient	Rx/Rx Patient	Percent Patients Receiving Rx
Total NPs (N = 61)	.67*	1.30	50.13*
Group A (N = 52)	.69*	1.23	51.16*
Group B (N = 9)	.60	1.32	43.82

(Findings reported in mean)

(*1 case incomplete data, thus not included in findings)

Table 7.2 Number of Medications Prescribed Per Patient by Group A

		Rx/Total Patients	Rx/Rx Patients	Percent Patients Receiving Rx
ANP	(N = 7)	.81	1.43	50.48
CNM	(N = 3)	.50	1.43	25.34
FNP	(N = 11)	.67	1.3	48.89
WHCNP	(N = 17)	.66	1.14	52.54
PMHNP	(N = 4)	.99*	1.64	45.45*
PNP	(N = 9)	.59	1.28	41.94

(*1 case incomplete data, thus not included in findings)
(Reported in mean)

Related Findings - Medications Prescribed Per Day

Nurse practitioners initiated $\bar{x}$ = 6.74 medication actions per day during the study period (including medications prescribed as well as medications discontinued). Group A nurse practitioners initiated $\bar{x}$ = 6.95 medication actions per day, and Group B nurse practitioners initiated $\bar{x}$ = 5.52 medication actions per day.

Table 8.1 shows the number medication actions and number of patients per day for Group A Nurse Practitioners.

Table 8.1 Number of Medication Actions and Patients Seen Per Day by Group A

Specialty		Rx Actions Per Day	Rx Patients Per Day	Total Patients Per Day
ANP	(N = 7)	7.24	5.31	11.29
CNM	(N = 3)	5.09	3.56	12.59
FNP	(N = 11)	8.98	6.47	12.84
WHCNP	(N = 17)	7.35	6.39	13.39
PMHNP	(N = 4)	8.83	4.93	6.45
PNP	(N = 9)	4.53	3.49	8.48

(Findings reported in mean)

CHAPTER IV

DISCUSSION

Intent of Study

The original intent of this study was to match sample groups (Group A and Group B), and compare findings between nurse practitioners with prescriptive privileges and nurse practitioners who prescribe via MD signature. However, because the Group B sample response was so small after four mailings, descriptive analysis was done.

Sample

Response among nurse practitioners with prescription writing privileges was very good. 47.60% of all of those nurses to whom initial inquiry was sent responded affirmatively. 92.98% of those who said they would participate did return completed instruments. Group A nurse practitioners have a vested interest in such a study which probably accounts for the response rate.

Nurse practitioners who do not have prescriptive privileges did not respond nearly as well to initial inquiry. This may be indicative of: 1) less vested interest in prescription writing, and 2) perhaps even more meaningful, a variety of work settings other than primary care, or 3) non-involvement with patient drug-management because of protocol restrictions in their work settings.

Reasons for electing not to participate among the Group A population included vacation plans for the study period (N = 5), part-time work (N = 1), no prescription writing (N = 1), and no reason given (N = 5). Fifty-four persons did not respond.

Non-participation responses among the Group B population to whom inquiry was sent included attending medical school (N = 1), not currently employed as an NP (N = 2), too busy/too much time required to participate (N = 3), maternity leave (N = 1), referred researcher to previous NPSIG study (N = 1), no longer in full-time practice (N = 1), no prescriptive certification (indicating unclear understanding of cover letter, N = 3), and no reason given (N = 12). Ninety did not respond.

Postage and cost of instrument duplication by participants may have been a factor in the overall response rate. The first mailing to nurse practitioners with prescriptive privileges was done in December, 1980, and included return postage and enough instruments that copies would not need to be made (this mailing per ONA NPSIG). The mailing in June, 1981, to nurse practitioners who had in the interim received prescriptive privileges, and to the 126 randomly selected nurse practitioners who do not have prescriptive privileges, did not include return postage, and only included two copies of the instrument (due to high cost to researcher). Three respondents complained about the cost to themselves for postage and duplication, commenting that the researcher should have included ample amounts of postage and instruments. One unhappy person identified personal cost to be $1.62.

Number of Days

Although guidelines for the study requested 10 clinical days for reporting prescription actions, the range was from 1-15. Vacation plans accounted for some of the less than 10 day participants. One practitioner commented that after one day she became frustrated with the amount of data requested and thus 'gave up'.

The finding of 97.88% overall appropriateness of total prescription actions (N = 4066) by Oregon nurse practitioners (98% of 3394, Group A) compares favorably with the findings of two studies reported in the literature review. Chambers and West (1978b) and Spitzer et al. (1974) found that prescription actions of NPs and physicians compared favorably, with no statistical significance between the adequacy ratings for both groups. Rating criteria for those studies were not identified, however, and the adequacy ratings were lower than the finding in this study. Chambers and West reported 71% adequacy rating for NPs and 75% for physicians.

Instrument Error

Confusion over log reporting may have accounted for many of the prescription actions rated "inappropriate". Directions may not have been clear enough. In instances where duration of therapy is important (i.e., anti-infectives), "inappropriate" ratings were assigned when that information was not included. Where MD signature was required (all Group B log entries, and Group A drugs not included in the NP drug formulary), confusion may have inadvertently caused the practitioner to leave that column unchecked, thus causing the prescription action to be rated "inappropriate".

Inappropriate Prescription Actions

Of the N = 86 prescription actions rated "inappropriate" (of N = 4066 prescription actions), two were for wrong drug, 31 were for wrong dose, and 53 were for wrong signature.

The wrong drug rating meant the drug was not appropriate for the condition for which it was prescribed. In one instance a broad spectrum antibiotic had been ordered both IM and PO for a condition that should

have been medicated with an antibiotic with a much narrower spectrum. In other words, it was "too large a gun" for the specific health problem noted by the practitioner.

The 31 instances of wrong dose were rated "inappropriate" when the prescribed dose was too low or too high according to the drug references used. Seventeen instances were for anti-infectives ordered at the correct dose, but the duration of treatment (or total number of prescribed tablets, etc.) was not specified. One anti-infective was prescribed at too low a dose for the specified skin problem. One instance of an anti-infective was dosed for a pediatric patient at a dose not available, nor easily achieved, per pediatric dropper. One antibiotic was prescribed prn at a low dose for 'one day only' for recurring urinary tract infection symptoms. A central nervous system drug was dosed too high for the indicated condition, although the dose was within general prescribing guidelines. Another CNS drug exceeded maximum dose limits for safety (although the Rx action was a refill action previously prescribed by a physician). Two CNS drugs did not specify strength (each supplied in more than one commonly prescribed strength). Three instances of ENT topicals were dosed for too long a period (although the container itself is self-limiting), and/or too many drops per ear (references specify problem with mucous membrane maceration if more than specified number of drops). One instance of no dosing directions occurred for a newly released topical anti-emetic. A conjugated estrogen did not include cycling instructions. An anti-hypertensive drug did not specify tablet strength (three strengths available).

Of the 53 prescription actions for which MD signatures were needed but not present, 24 were prescribed by Group A nurse practitioners and involved drugs not on the NP drug formulary during the time of the study period. Of these, 11 actions were for a topical anti-infective that had been deleted from the formulary (two NPs), two were for antibiotics (same drug), and one for a CNS drug. Ten were for refill medications previously prescribed by an MD, but did not include notation of MD signature for the refill when reported on the log (attributed to log confusion as previously stated). Of these 10 refill actions, one was for a hormone, four for antihypertensives, three for a tranquilizer (same drug), one for an unclassified therapeutic, and one was an autonomic drug.

Twenty-nine of the 53 drug actions needing MD signatures were for OTC drugs prescribed by Group B practitioners, and may have been due to confusion about log reporting. Whether or not the OTC drugs were actually suggested to the client or prescribed in written format, the log entries suggest "prescription", thus requiring an MD signature. This information was not made clear in the log reporting directions.

Number of Different Drugs and Drug Categories

Of the 19 drug categories prescribed by nurse practitioners in the study, individual practitioners prescribed from only $\bar{x}$ = 7.0 (Group A $\bar{x}$ = 6.83, Group B $\bar{x}$ = 8.0). The total sample prescribed an average of $\bar{x}$ = 20.28 different drugs during the study (Group A $\bar{x}$ = 19.69, Group B $\bar{x}$ = 23.67). These findings support the concept that nurse practitioners prescribe a limited number of different drugs from a limited number of drug categories. It also supports what many NPs have been saying

about their individual prescribing practices.

Of the Group A nurse practitioners, FNPs (N = 11) prescribed from more drug categories ($\bar{x}$ = 9.91) than the other groups, and also prescribed the greatest number of different drugs ($\bar{x}$ = 32.46). These findings are not surprising for a specialty that deals with a wide range of patient ages and health problems.

CNMs (N = 3) were second in terms of number of drug categories ($\bar{x}$ = 9.33), and third in number of different drugs ($\bar{x}$ = 19.33). Although a very small sample size, findings reflect the expanded role responsibilities associated with labor and delivery.

ANPs (N = 7) were third in number of drug categories ($\bar{x}$ = 8.29), but second in number of different drugs prescribed ($\bar{x}$ = 27.14). These findings reflect the generally diverse nature of patient problems encountered in adult ambulatory settings, and again, are not surprising.

PNPs (N = 9) prescribed from $\bar{x}$ = 6.22 drug categories, and prescribed $\bar{x}$ = 11.78 different drugs. These again are predictable findings when the scope of pediatric practice is considered, along with the high number of well child visits.

WHCNPs (N = 17) prescribed from $\bar{x}$ = 5.29 drug categories and prescribed $\bar{x}$ = 14.47 different drugs. Birth control pills were all considered to be the same drug, and thus the 'different drug' findings may be falsely low as WHCNPs prescribed a large number of that drug.

PMHNPs (N = 4) prescribed $\bar{x}$ = 14.5 different drugs from only $\bar{x}$ = 2.0 drug categories. The drug category findings reflect the very narrow scope of practice of this specialty area. One subject among the sample did not prescribe any drugs for patients seen during the 10 clinical days, but instead indicated use of relaxation techniques.

The narrower the scope of practice of the nurse practitioner specialties, the fewer drug categories prescribed from, and, with the exception of PMHNPs, the number of different drugs prescribed show a corresponding decrease.

Drug Categories and Health Problems

The most frequently prescribed drug categories were hormone/synthetic substitutes, followed second by anti-infectives and third by central nervous system drugs. The health problems most frequently prescribed for were preventive/health supervision ($\bar{x}$ = 20.53) followed by genitourinary problems ($\bar{x}$ = 13.46). These two health problem categories were prescribed an average of at least four times more frequently than the third place health problem, skin and cellular tissue problems ($\bar{x}$ = 3.33). Of the 15 remaining health problem categories, eight were prescribed for less than $\bar{x}$ = 2.0 times per NP and seven less than $\bar{x}$ = 1.0 time per NP.

These findings differ somewhat from the literature (Chamber & West, 1978b) reports which suggest that antibiotics ranked highest among the drug categories prescribed by nurse practitioners. In this study anti-infectives ranked a close second, preceded only by hormones/synthetic substitutes. This may be partially explained by the large number of WHCNPs in the sample, and which were (by one-way analysis, ANOVA $p < .05$) prescribed significantly more frequently by Group A WHCNPs than by other NP groups. Three Group A specialty areas did prescribe anti-infectives as the most frequently prescribed drug category (ANPs, FNPs, and PNPs). In addition, one specialty (WHCNPs) prescribed anti-infectives as the second most frequent category.

Among Group A nurse practitioners, only two groups prescribed the hormone/synthetic substitute category most frequently (WHCNPs and CNMs), and two groups prescribed it as the second most frequent (ANPs and FNPs). However, the numbers prescribed particularly by the WHCNPs and CNMs were such that this drug category ranked number one for Group A (as well as for the total sample).

Central nervous system drugs ranked third in this study, but were prescribed in large numbers by only one specialty, PMHNPs. Two other specialties prescribed this category as the third most frequent, ANPs and FNPs. One-way analysis (ANOVA, $p < .05$) showed that the PMHNPs prescribed this category significantly more frequently than did the other specialties.

The only other findings of statistical significance (One-way, ANOVA $p < .05$) were for six other categories by three specialty areas. CNMs prescribed vitamins, iron replacements, and oxytocics significantly more frequently than did the other specialties. PNPs prescribed serums/toxoids/vaccines and unclassified therapeutics (primarily flouride supplements) more frequently than other groups, and PMHNPs prescribed autonomic drugs at a higher frequency.

The literature (Draye & Pesznecker, 1979; Repicky et al., 1980; Ward, 1979) findings indicated that the most frequent foci of health problems seen by NPs were respiratory, followed closely by circulatory, and then by EENT and genitourinary problems. It was not clear whether or not these were related to drug management, while this study's results are based solely on health problems for which drug management occurred. Group A FNPs did see respiratory problems (and genitourinary problems) as the most frequent focus requiring drug management.

Similarly, only ANPs treated circulatory problems with any frequency, and it was the fourth most frequent drug management focus for that specialty.

Genitourinary problems were the most frequent problem focus treated by two specialties, ANPs and FNPs, and the second most frequent for WHCNPs and CNMs. Preventive/health supervision was the number one focus seen by PNPs, WHCNPs and CNMs, and the number two focus seen by FNPs. Not surprising, PNPs saw ENT and skin/cellular tissue problems as the second and third most frequent problem. ANPs saw endocrine/metabolic/nutritional problems as their third most frequent focus, and CNMs saw pregnancy/parturition/puerperium as the third most frequent focus of problems. PHMNPs saw mental health problems most frequently.

Again, in all cases, the findings are predictable based on the scope of practice for each of the Group A specialty areas. One-way analysis (ANOVA, $p < .05$) findings of significant difference were also predictable for the same reason, and included six health problem categories by five specialties. ANPs prescribed for endocrine/metabolic/nutritional problems more frequently than other NP groups; CNMs prescribed for problems of the blood/blood forming organs more frequently than other groups; WHCNPs prescribed for genitourinary problems more frequently than other groups; and PMHNPs prescribed for mental health problems more frequently than other NP groups. PNPs prescribed for skin/cellular tissue problems significantly more frequently than did one other specialty, PMHNPs; and CNMs and WHCNPs prescribed for preventive/health supervision reasons significantly more often than two practitioner groups, ANPs and PMHNPs.

Number of Medications Prescribed Per Patient

Only $\bar{x}$ = 50.13% of all patients seen by nurse practitioners in this study were prescribed medication. This supports and lends credence to the preventive health and health education focus of nurse practitioners in the primary care setting. This finding is different, however, than that of two studies reported in the literature review. Repicky, Mendenhall, and Neville (1980) found that nurse practitioners prescribed systemic drugs for only 17.4% of their patients over a three day period, and Chambers and West (1978b), found that FNPs prescribed medications to 24.6% of patients seen. Those literature studies were prior to independent prescriptive certification of nurse practitioners, and may reflect minimal usage of drug management as a treatment modality because of the requirement of MD signature for prescription actions. The higher percentage of prescription actions found in this study may be accounted for by changes in the law that allow for drug management by qualified NPs. Additionally, nurse practitioners have been managing patient care in primary care settings for a longer period of time, and the findings are perhaps a reflection of increased knowledge, experience, and security with drug management of health problems.

The literature does not report numbers of medications prescribed per patient, making these findings particularly interesting. Nurse practitioners prescribed only $\bar{x}$ = .67 drugs per patient (total patients seen) and $\bar{x}$ = 1.30 drugs per patient receiving medication. Group A prescribed $\bar{x}$ = .69 drugs per total patient and $\bar{x}$ = 1.23 per patient receiving medication. Among the Group A specialties less than $\bar{x}$ = .50 difference existed between the number of drugs prescribed per (total)

patient, and less than $\bar{x}$ = .3 difference for drugs prescribed per patient receiving medication.

ANPs prescribed for the highest percentage of patients, but PMHNPs prescribed the highest number of medications per patient (per total patient and per patient receiving medication). CNMs prescribed for the lowest percentage of patients, and the least number of drugs per total patients. WHCNPs prescribed the fewest number of drugs per patient receiving medication. Although testing for significant difference was not done, the prescribing among the specialty groups appears very similar.

CHAPTER V

SUMMARY

Nurse practitioners nationwide have gained respect and recognition for their patient management in primary care settings. Drug management has been a part of their practice, but only in a limited manner as MD signatures were required for all prescription actions. Recently, Nurse Practice Acts have been changed, broadening the scope of nurse practitioner roles in primary care by allowing (in Oregon) limited prescriptive privileges to qualified nurse practitioners. Safe and effective prescription writing is guided by specific educational requirements, an advisory council, and a drug formulary limited by scope of practice.

Literature findings in recent years have shown nurse practitioner drug management under physician supervision to be safe, effective, and comparable to that of physicians. Studies are not available, however, reporting findings of prescription writing practices of nurse practitioners with prescriptive privileges. This study was designed to describe those practices.

The original intent of the study was to compare findings for nurse practitioners who prescribe independently (Rx privileges) and nurse practitioners who prescribe via MD signature. Poor response by the latter group, however, allowed only for broad description of Oregon nurse practitioners' prescribing practices and more specific information about nurse practitioners with prescriptive privileges.

Questions asked were: 1) do nurse practitioners prescribe appropriately?, 2) from how many different drug categories do nurse prac-

titioners frequently prescribe?, 3) for what health problem categories do nurse practitioners frequently prescribe?,and 4) how many medications do nurse practitioners prescribe per patient? Analyses included frequencies and measurements of central tendency for the variables. ANOVA were done to determine if significant differences existed between and among Group A specialty areas (nurse practitioners with prescriptive privileges) for two variables, drug categories and health problem categories.

Sixty-one nurse practitioners made up the total sample, 52 with Rx privileges, and nine without Rx privileges. Of the 52 nurse practitioners with Rx privileges, ANPs N = 7, CNMs N = 3, FNPs N = 11, WHCNPs N = 17, PMHNPs N = 4, and PNPs N = 9. A prescription log was used by each participating practitioner to report prescribing information for ten clinical days.

The findings in this study, although not entirely consistent with the literature, lend support to the preventive nature of nurse practitioner scope of practice. That nurse practitioners prescribe appropriately is confirmed by the 97.88% of all medication actions (4066) rated appropriate, compared to literature reports of 75% and 71% for physicians and nurse practitioners respectively (Chambers & West, 1978b). Criteria for rating prescriptive actions either appropriate or inappropriate in this study included correct dosage, indications for prescribing, absence of contraindications, and correct provider signature (NP signature, or NP signature with MD cosign). The literature reports do not identify rating criteria or reporting format (i.e., written prescription vs prescription log). Nurse practitioners with prescriptive privileges prescribed 3394 medications actions, 98.0% of which were

rated appropriate.

Nurse practitioners in the study prescribed from $\bar{x}$ = 7.0 different drug categories and prescribed $\bar{x}$ = 20.28 different drugs. NPs with prescriptive privileges prescribed from $\bar{x}$ = 6.83 different drug categories for the study period, and prescribed $\bar{x}$ = 19.69 different drugs. The nurse practitioners prescribed $\bar{x}$ = .67 medication per patient (total patients seen), and $\bar{x}$ = 1.30 per patient receiving prescriptive action. Nurse practitioners with prescriptive privileges prescribed $\bar{x}$ = .69 medications per total patients seen, and $\bar{x}$ = 1.23 per patient receiving prescriptive action.

The drug category most frequently prescribed by the total sample and by NPs with prescriptive privileges was hormones/synthetic substitutes, followed by anti-infectives second, and CNS drugs third. These findings differed from the literature findings which suggested that antibiotics ranked number one among drug categories prescribed by nurse practitioners (Chambers & West, 1978b).

The health problem most frequently prescribed for was that of preventive/health supervision, followed second by genitourinary problems. Again, these findings differ from the literature findings (Draye & Pesznecker, 1979; Repicky et al., 1980; Ward, 1979) that respiratory problems were the most frequent health problem seen by nurse practitioners, followed by circulatory problems, and then by EENT and genitourinary problems. Nurse practitioners with prescriptive privileges in this study saw respiratory and genitourinary problems as the most frequent foci of problems requiring drug management.

Medications were prescribed for $\bar{x}$ = 50.13% of all patients seen by nurse practitioners in this study, as opposed to the 17.4% and 24.6%

suggested in the literature (Repicky, Mendenhall, Neville, 1980; Chambers & West, 1978b). Nurse practitioners with prescriptive privileges prescribed medications for $\bar{x}$ = 51.16% of all patients seen.

Additional findings included the number of medication actions per day. An average of $\bar{x}$ = 6.74 medication actions were prescribed per day; nurse practitioners with prescriptive privileges prescribed an average of $\bar{x}$ = 6.95 per day. There was no reference of similar findings in the available literature.

Findings tend to confirm that nurse practitioners not only prescribe from a limited number of drug categories, but also that the number of different drugs prescribed is limited. That less than 51% of all patients seen by nurse practitioners (less than 52% for NPs with prescriptive privileges) result in prescriptive action reflects health care foci such as counseling, patient teaching, and other non-drug treatment modalities utilized by nurse practitioners. The high percentage of appropriate prescription actions lends credence to the value of legislation giving drug management rights to this knowledgeable group of health care providers.

Limitations of Study

1. Unequal numbers of participants between Groups A and B, and between Group A specialty areas.
2. Prescription log that was confusing, and perhaps too cumbersome for accurate information reporting.
3. Study period that was primarily from two different times of the year (December and July). A year-around study period would yield more accurate information without the tendency to reflect seasonal idio-

syncracies.

Suggestions for Further Study

1. A repeat of this study; refining of the prescription log.
2. Develop criteria for rating appropriateness of written prescriptions, and study the written prescriptions of NPs (as in a pharmacy setting) for a period of time.
3. Study the appropriateness of nurse practitioner prescriptions compared to those of physicians during a similar time frame (written prescriptions received by a pharmacy setting).
4. Study the nature of services received by patients of NPs other than drug management, such as health counseling, patient education, exercises, relaxation techniques, etc.
5. Develop hypotheses about the most frequently prescribed drug categories and the most frequently seen health problems by nurse practitioners, and test those hypotheses using a more restrictive log including only medications prescribed and health problems seen.
6. Study the number of OTC drugs vs prescription drugs prescribed or suggested to patients by nurse practitioners.

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APPENDICES

APPENDIX A

OREGON NURSE PRACTICE ACT - PERTAINING TO NURSE PRACTITIONERS

(Nurse Practioners)

'5 Nurse practitioners; certifi-
›hibitions; drug prescriptions. (1)
is authorized to issue certificates of
›mpetency to licensed registered
practice as nurse practitioners if
the requirements of the board pur-
)RS 678.380.

› person shall practice as a nurse
er or hold oneself out to the public or
loyer, or use the initials, name, title,
›n or abbreviation as a nurse practi-
il and unless such person is certified
ırd.

egistered nurse, certified as a nurse
er, is authorized to prescribe drugs
se of and administration to other
approval has been given under ORS
The drugs which the nurse practi-
authorized to prescribe shall be in-
hin the certified nurse practitioner's
›ractice as defined by rules of the
ject to ORS 678.385.

e dispensing of certain limited medi-
escribed by a nurse practitioner in
e with the formulary established
S 678.385 and dispensed by a regis-
rmacist or an employer thereof may
by a pharmacist according to the
he prescription. The filling of such a
on shall not constitute evidence of
e on the part of the pharmacist if the
on was dispensed within the reason-
›rudent practice of pharmacy.

used in this section:

rug" means medicines and prepara-
internal or external use of human
›ich are recognized in the formulary
ursuant to ORS 678.385.

rescribe" means to direct, order or
the preparation, use of or manner of
spoken or written words. [1975 c.205
35 §1]

30 Rules for nurse practitioners;
he board may adopt rules applicable
›ractitioners:

hich establish their education, train-
ualifications necessary for certifica-

hich limit or restrict practice.

hich establish categories of nurse
er practice and define the scope of
tice.

(4) Which establish procedures for maintaining certification, including continuing education and procedures for the reinstatement of certificates rendered void by reason of nonpayment of fees. [1975 c.205 §9]

678.385 Advisory council on nurse practitioners' privileges of writing prescriptions. (1) Recognizing that the scope of practice of the nurse practitioner is a collaboration of the professions of nursing and of medicine, the advisory council on nurse practitioners' privileges of writing prescriptions shall consist of nine members as follows:

(a) One physician member of the Board of Medical Examiners for the State of Oregon designated by the board of medical examiners.

(b) Two physicians licensed by the Board of Medical Examiners for the State of Oregon designated by the Oregon Medical Association, one of whom shall be engaged in medical practice in a rural area.

(c) One nurse member of the Oregon State Board of Nursing who is licensed to engage in the practice of registered nursing designated by the board of nursing.

(d) Two certified nurse practitioners designated by the Oregon Nursing Association, one of whom shall be from a rural area.

(e) Three pharmacists designated by the State Board of Pharmacy, one of whom shall be a member of the board of pharmacy, one of whom is in hospital practice and one of whom is in community practice, and one of whom shall be from a rural area.

(2) If any designation is not made by the appropriate authority within 45 days after July 25, 1979, the Governor shall make the necessary designation from the category from which the designation has not been made.

(3) The advisory council shall elect its own chairperson with such powers and duties as the council shall fix.

(4) A quorum of the advisory council shall be five members.

(5) On or before January 1, 1980, the advisory council established under subsection (1) of this section shall advise the Board of Medical Examiners for the State of Oregon of the list of drugs and medicines to be included in the formulary that may be prescribed by a nurse practitioner acting under ORS 678.375. Controlled substances listed in schedules III, III N, IV and V for controlled substances shall be part of the formulary that may be prescribed by a nurse practitioner if recommend-

ed by the council unless the council finds that a substance on schedule III, III N, IV or V shall be excluded from the formulary. The advisory council may revise its recommendations periodically and submit any revised recommendations to the board and the board shall adopt the revised recommendations.

(6) Pursuant to ORS 183.310 to 183.500, the board shall adopt the formulary described in subsection (5) of this section and may revise the formulary only upon recommendation of the advisory council.

(7) The term of each member of the advisory council shall be for two years. A member shall serve until a successor is appointed. If a vacancy occurs, it shall be filled for the unexpired term by a person with the same qualifications as the retiring member.

(8) The advisory council shall report to the Sixty-first Legislative Assembly on procedures involved in adopting and revising the formulary required by this section. [1979 c.785 §16]

Note: 678.385 was enacted into law by the Legislative Assembly but was not added to or made a part of ORS chapter 678 or any series therein by legislative action. See the Preface to Oregon Revised Statutes for further explanation.

678.390 Application of nurse practitioner to write prescriptions or dispense drugs. (1) In addition to the duties described in ORS 678.385, the advisory council shall review and may approve the application of a certified nurse practitioner who seeks the privilege of writing prescriptions for drugs described in the formulary. If the application is denied, the nurse practitioner may appeal the denial as from a final order in a contested case under ORS 183.480 to 183.500.

(2) The application of the nurse practitioner shall be on a form prescribed by the advisory council and shall be accompanied by a nonrefundable application fee of $60, payable to the Health Division Account, which is continuously appropriated to the Board of Medical Examiners for the State of Oregon and shall be used only for the administration and enforcement of ORS 414.325, 453.025, 475.005, 616.855, 678.375, 678.385, 678.390, 689.605, 743.128 and 750.055.

(3) Upon recommendation of the advisory council, the board of medical examiners shall grant the privilege of writing prescriptions described in the formulary.

(4) A certified nurse practitioner may make application to the advisory council for emergency drug dispensing authority if the certified nurse practitioner's practice is located in an area of the state where geographic conditions severely limit the ability of the certified nurse practitioner to meet emergency patient needs. Criteria to be used by the advisory council in reviewing the application shall include but not be limited to the proximity in road miles of the nearest community pharmacy, general road conditions and weather conditions. Such emergency dispensing shall be from prepackaged drugs, from the formulary authorized under ORS 678.385, prepared by a licensed pharmacist.

(5) The board of medical examiners shall renew the privilege of writing and dispensing drugs for a nurse practitioner who applies for the privilege and satisfies the requirements of this section and the advisory council. The biennial renewal fee is $30.

(6) The privilege of writing prescriptions and dispensing drugs may be suspended or revoked by the board of medical examiners upon proof that the privilege has been abused. The procedure shall be a contested case under ORS 183.310 to 183.500.

(7) Nothing in this section requires a hospital, as defined in paragraph (a) of subsection (11) of ORS 442.015, to allow a nurse practitioner to write prescriptions for the hospital pharmacy. [1979 c.785 §17]

Note: See note following 678.385.

(Fees)

678.410 Fees. The following schedule establishes the maximum examination and license fees for registered and practical nurses. Actual fees, not to exceed the maximums, shall be established by the board and are subject to approval by the Executive Department.

	Registered Nurses	Practical Nurses
(1) License renewal	$25	$15
(2) Examination for licensure	$45	$35
(3) License by indorsement	$35	$25
(4) Limited license	$10	$ 5
(5) Examination proctor service	$45	$35
(6) Duplicate license	$10	$10
(7) Extension of limited		

APPENDIX B

ADMINISTRATIVE RULES ON NURSE PRACTITIONERS' PRESCRIPTION PRIVILEGES

STRATIVE RULES ON NURSE PRACTITIONERS' PRESCRIPTION PRIVILEGES (12/79)

-005 REQUIREMENTS FOR INITIAL APPLICATION FOR NURSE PRACTITIONERS' IPTION PRIVILEGE CERTIFICATION

Nurse Practitioner applicant for authority to prescribe legend drugs shall:

a) Have practiced as a Nurse Practitioner for one year immediately prior to ng for prescriptive authority, not counting preceptorship.

b) Be currently certified as a Nurse Practitioner under ORS 678.375.

c) Provide evidence of completion of thirty contact hours of education in cology which includes content in prescription writing, drug selection, nteractions, information resources, and pharmacology relating to the ant's specific scope of practice, and which are:

(A) Obtained within a one-year period immediately prior to the date lication for prescriptive authority and -

(B) Derived from the following:

(i) Non-credit courses or other offerings that include pharmacology, s workshops, seminars, conferences, and institutes approved by the Advisory l. For these sources, one contact hour may be awarded for each hour of attendance.

(ii) Formal academic study other than that within the applicant's ication program: PROVIDED, that if study within the applicant's certification was taken within one year immediately prior to application for prescriptive ty and including specific hours of study in pharmacology, such hours of study used to satisfy this requiremment. For these sources, fifteen contact hours awarded per semester credit, ten contact hours per quarter credit, or one hour per each hour of actual attendance.

(iii) Presentation or publication of a paper as approved for credit Advisory Council on a subject in the applicant's specialty area. For this not more than five contact hours may be credited.

(iv) Other learning activities as approved for credit. For thi
source not more than ten hours may be credited.

(C) The Advisory Council reserves the right to disallow or decreas
amount of credit claimed for any activity, for good cause shown.

(2) A completed notarized application must be submitted and accompanied by a
non-refundable application fee of $60.00.

(3) After a period exceeding twelve months from the date of initial applicat
if that application is not acted upon or approved by the Advisory Council, a
application shall be submitted.

(4) Obtain from the Board of Nursing proof of Registered Nurse license and N
Practitioner certification indicating number, status, and identifying specifi
practice areas.

(5) Upon approval by the Advisory Council of the initial application for pre
tive privilege, a certification fee of $30.00 shall be required. The applica
and fee for renewal of this certification must be submitted on or before Apri
of each subsequent odd numbered year.

847-60-010 AUTHORIZED PRESCRIPTIONS AND DISPENSING BY THE NURSE PRACTITIONER

(1) Each written prescription shall include the printed name, scope of pract
address and telephone number of the prescribing Nurse Practitioner; the name
the patient and the date the prescription is written and signed followed by t
letters indicating scope of practice

(2) The prescribing nurse practitioner may write prescriptions for over-the-c

(3) The prescribing nurse practitioner may write prescriptions for medical de
appliances.

(4) Drugs on the formulary may be prescribed, administered or dispensed in cc

(5) Any product name drug may be prescribed, administered or dispensed as lor
generic name for that product is listed on the formulary.

(6) The prescribing Nurse Practitioner shall comply with all applicable laws
rules in prescribing, administering and dispensing drugs; including compliance
labeling requirements of Section 34 of Chapter 777 of Oregon Laws, 1979.

)15 PRESCRIPTIVE AUTHORIZATION RENEWAL

d of Medical Examiners shall renew the privilege of writing and dispensing r a Nurse Practitioner who applies for the privilege and satisfies the g requirements:

mit a completed application for renewal with the non-refurndable certification 30.00.

The renewal date for all certifications after January 1, 1980 shall be th of every odd numbered year.

Upon failure to comply with renewal requirements by the April 30th , the certification shall be delinquent and reapplication is required.

mit documentation of current Nurse Practitioner certification required 78.375 for the entire prescription privilege renewal period.

mit documentation of twenty-five contact hours of continuing education within the renewal period, relating to pharmacology within the specific practice as defined under OAR 847-60-005.

20 TERMINATION OF PRESCRIPTIVE AUTHORIZATION

privilege of writing prescriptions and dispensing drugs may be suspended ed by the Board of Medical Examiners upon proof that the privilege has sed. Abuse would include but not be limited to the following:

Prescribing, dispensing or administering drugs outside the Nurse oner's scope of practice.

Prescribing, dispensing or administering drugs for other than therapeutic lactic purposes.

Failure to meet the applicable laws and rules, including payment of all in the prescribed periods of time.

5 NOTIFICATION OF CHANGE OF PRACTICE

practice status or settings shall be reported to the Advisory Council than 30 days after the change.

APPENDIX C

DATA INSTRUMENTS

MEDICAL-SURGICAL
NURSING DEPARTMENT
SCHOOL OF NURSING

Area Code 503 225-7839

3181 S.W. Sam Jackson Park Road

Portland, Oregon 97201

UNIVERSITY OF OREGON

HEALTH SCIENCES CENTER

June 20, 1981

Dear Nurse Practitioner:

My name is Patricia Krumm. I am a graduate student at the Oregon Health Sciences University School of Nursing. I am conducting a research project titled "Prescription Writing Practices of Oregon Nurse Practitioners" under the supervision of Sharon Clark, R.N., F.N.P., M.N. As you are aware, the passage of HB-2806 has expanded the scope of practice for nurse practitioners in our state. Documentation of nurse practitioner prescription writing practice is necessary in order to evaluate the impact of this legislation. Your voluntary participation in this research will assist in such documentation. While you may not benefit directly from participating, all Oregon nurse practitioners may be helped by the results of this study.

The study consists of a daily prescription log documenting each drug you prescribe for 10 consecutive clinical days. The log asks about the prescription - name of the drug, dosage and instructions, whether it is a new or modified treatment, who initiates and signs the prescription; about the client's health problems; and about your related actions. Each prescription entry will take approximately one minute. Two copies of the daily log are enclosed. If you choose to participate in this study, please make additional copies (1 log sheet for each of 10 clinical days).

Enclosed is a self-addressed postcard on which you are asked to indicate whether or not you will participate in this research project. Please check the appropriate response and return the postcard within one week. Only your nurse practitioner specialty area should be included on the postcard.

If you agree to participate in the study, please read the instructions carefully and return the completed prescription log sheets in the enclosed self-addressed envelope within 30 days. No identification numbers or names are to be written on the log. You are asked only to identify your nurse practitioner certification specialty area. Data will be reported in aggregate form so that no single individual will be identified with specific answers. The record of names to whom data instruments are sent will be destroyed after the sample is complete. There will be no record of individual participants.

I will be available to answer any questions you may have about your participation in this study or about the use of the prescription log itself. Please call me at 266-1411.

You may refuse to participate in this study, or withdraw at any time without affecting your relationship with, or treatment at, the Oregon Health Sciences University.

Your voluntary return of the completed prescription log sheets will indicate that you understand what is required of you, and will ser as consent to participate in this study. Results of the study will be made available on request.

Sincerely,

[redacted]

Patricia C. Krumm, R.N., B.S.N
Graduate Student, School of Nu

PRESCRIPTION WRITING STUDY

INSTRUCTIONS:

1. Return the post-card indicating participation or non-participation within one week.

2. Complete the daily log, documenting each prescribed drug you give for 10 consecutive clinical days (include over-the-counter drugs).

3. Use a separate log sheet for each clinical day. Two log sheets are provided for you. Please make additional copies.

4. When numbering "patient encounters",

   a) begin with #1 each clinical day;

   b) each patient for whom you prescribe (or discontinue) a drug is to be numbered consecutively (i.e., #1 patient may have 4 drugs prescribed, thus #1 will be repeated on 4 lines; #2 patient may have only 1 prescribed drug, thus taking only 1 line).

5. Should you be unsure about how to enter any particular prescription encounter, include an explanation of the situation.

6. Return the completed log sheets as soon as possible, but no later than 30 days after receiving the packet in the mail. Use the enclosed envelope and mail to:

Patricia Krumm
12620 S. Carus Rd.
Oregon City, Oregon 97045

Patient Encounter #	NAME OF DRUG PRESCRIBED OR DISCONTINUED	RX INSTRUCTIONS Dose, frequency, and for how long	NP initiates	NP initiates MD cosign necessary	MD initiates	Prev Rx initiated by NP	Prev Rx initiated by MD	PREV RX YES	PREV RX NO	Side effects	No longer necessary	New Patient	Established P	Health? prob underlying	List patient other chronic illness prnbs	Patient's as	MD consult prior to RX	Follow-up appt. made	MD referral

[1] Use a new log sheet for each date

[2] Each patient numbered consecutively beginning #1 each day

[3] See reverse side for number legend

NUMBER OF NEW PATIENTS SEEN TODAY _____

NUMBER OF ESTABLISHED PATIENTS SEEN TODAY _____

TOTAL NUMBER OF PATIENTS SEEN TODAY _____

ICHPPC/H-IDCA DIAGNOSTIC CLASSIFICATION

(Use ONLY ONE for the diagnosis underlying prescription and as many as applicable for chronic illness problems)

Record the corresponding number in the space provided on Prescription Log Questionnaire:

A. INFECTIVE AND PARASITIC DISEASES
1. Intestinal infectious disease (e.g. diarrhea)
2. Tuberculosis
3. Viral diseases with exanthem (e.g. chickenpox, rubella)
4. Infectious hepatitis
5. Infectious mononucleosis
6. Syphilis
7. Gonorrhea
8. Mumps
9. Other

B. NEOPLASMS
10. Breast
11. Skin
12. Bronchus, Lung
13. Uterus
14. Colon
15. Prostate
16. Other

C. ENDOCRINE, NUTRITIONAL, METABOLIC DISORDERS
17. Thyroid
18. Diabetes Mellitus
19. Obesity
20. Other

D. 21. DISEASES OF THE BLOOD AND BLOOD FORMING ORGANS (e.g. anemia)

E. MENTAL DISORDERS, PERSONALITY DISORDERS, AND PSYCHONEUROSIS
22. Alcohol abuse
23. Drug abuse
24. Anxiety neurosis
25. Depressive neurosis
26. Tension headache
27. Adjustment reaction of childhood
28. Adjustment reaction of adolescence
29. Adjustment reaction of adult life
30. Adjustment reaction of late life
31. Insomnia
32. Enuresis
33. Psychophysiologic disorders (e.g. impotence, frigidity backache, etc.)
34. Other

F. DISEASES OF THE NERVOUS SYSTEM
35. Diseases of the Central Nervous System
36. Diseases of the peripheral nerves

G. DISEASES OF THE EYE
37. Conjunctivitis
38. Refractive errors
39. Cataract

I. DISEASES OF THE CIRCULATORY SYSTEM
47. Benign Hypertension +/- heart, renal disease
48. Myocardial infarction
49. Angina pectoris
50. Disorders of heart rhythm
51. Congestive heart failure
52. Cerebral hemorrhage
53. Transient ischemic attack
54. Arteriosclerosis
55. Peripheral vascular disease
56. Phlebitis, thrombophlebitis, varicose veins
57. Hemorrhoids
58. Other

J. DISEASES OF THE RESPIRATORY SYSTEM
59. Acute nasopharygitis (common cold, URI)
60. Acute pharyngitis (including strep.)
61. Sinusitis
62. Influenza
63. Pneumonia
64. Bronchitis
65. Emphysema
66. Asthma
67. Rhinitis (vasomotor or allergic)
68. Other

K. DISEASES OF THE DIGESTIVE SYSTEM
69. Diseases of the teeth and supporting structures
70. Ulcer (duodenal or stomach)
71. Gastritis, heartburn
72. Appendicitis
73. Hernia
74. Cirrhosis of the liver
75. Cholecystitis
76. Other

L. DISEASES OF THE GENITOURINARY SYSTEM
77. Cystitis and urinary infection
78. Calculi of kidneys/ureters
79. Benign prostatic hypertrophy
80. Other diseases of the male genitalia
81. Other diseases of the female genitalia
82. Vaginitis, vulvitis, cervicitis (nonvenereal)
83. Disorders of the menstrual cycle
84. Menopausal symptoms
85. Other

M. COMPLICATIONS OF PREGNANCY, PARTURITION, PUERPERIUM
86. Complications of pregnancy
87. Abortion (spontaneous/induced)
88. Complications of puerperium

N. DISEASES OF MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE
94. Arthritis and/or rheumatism
95. Disc disorder
96. Back pain (physiologic)
97. Other

P. INJURIES AND ADVERSE EFFECTS
98. Fracture, dislocation, sprain
99. Laceration
100. Burns
101. Poisonings
102. Other

Q. PREVENTIVE/HEALTH SUPERVISION
103. General (medical) examination
104. Prenatal care (including diagnosing pregnancy)
105. Post natal care
106. Well child care
107. Immunization
108. Family planning
109. Other

R. SOCIAL/MARITAL/FAMILY PROBLEMS
110. Economic problems
111. Housing problems
112. Marital problems/family disruption
113. Educational problems
114. Occupational problems (including unemployment)
115. Other

NP Specialty Area

____FNP	____GNP	____WHCNP
____PNP	____CNM	____SHCNP
____ANP	____PMHNP	____CHCNP

____Yes, I will participate in this prescription writing study.

____No, I will not be participating in this prescription writing study.

(Postcard to be mailed on receipt of data instruments)

APPENDIX D

TOOL TO DETERMINE IF DRUGS APPROPRIATE OR INAPPROPRIATE

TOOL TO DETERMINE IF DRUGS APPROPRIATE OR INAPPROPRIATE

✓- Appropriate
0- Inappropriate

Appropriate - all
Inappropriate - if any 0

ug	Diagnosis (1)	Correct dose (2)	Contraindications (3)	Signature (4)	Approp.	Inapprop.
ug	✓	✓	✓	✓	✓	
ug	✓	0	✓	✓		✓

	Appropriate	Inappropriate
agnosis -	Meets resource guidelines for clinical indications for use	Diagnosis not listed in resources per indications for use
rrect Dose -	Meets resource guidelines for dosage and instructions	Dosage not within resources guidelines Instructions for use not within resource guidelines
ntraindications -	No contraindicated health problems, per resources	Contraindicated health problem, per resource
propriate Signature -	<u>Group A Subjects</u> Physician cosign on - legend drugs not listed on NP drug formulary - Drugs not within NP scope of practice	<u>Group A Subjects</u> NP signature only on - legend drugs not listed on NP drug formulary - Drugs not within NP scope of practice
	<u>Group B Subjects</u> Physician cosign on all prescriptions	<u>Group B Subjects</u> NP signature only

ABSTRACT

AN ABSTRACT OF THE CLINICAL INVESTIGATION

OF

PATRICIA CARLOTTA KRUMM

For the MASTER OF NURSING

Date of Receiving this Degree: June 11, 1982

Title: PRESCRIPTION WRITING PRACTICES OF OREGON NURSE PRACTITIONERS

APPROVED: _____

Sharon Clark, M.S.N., F.N.P., Clinical Investigation Advisor

Oregon's Nurse Practice Act authorizes the independent prescribing of drugs by qualified nurse practitioners. This study was undertaken in order to determine the prescription writing practices of Oregon nurse practitioners.

Of the 61 nurse practitioners who participated in the study, 52 have prescriptive privileges and nine prescribe via physician signature. Six of the nine nurse practitioner specialty areas are represented.

The nurse practitioners recorded all patient encounters and medication actions on a prescription log for 10 clinical days. Descriptive analyses were done, including frequencies and measurements of central tendency. One-way analyses of variance were done for two variables, drug categories and health problems.

Of the 4066 medication actions initiated by nurse practitioners during the study period, 97.88% were rated appropriate. The drug categories most frequently prescribed were hormone/synthetic substitutes

and anti-infectives. Preventive/health supervision and genitourinary problems were the health problem categories for which medication action was most frequently initiated. The nurse practitioners prescribed medication from $\bar{x}$ = 7.0 different drug categories and initiated $\bar{x}$ = .67 medication actions per patient.

In addition to the findings reported for the entire sample, separate findings are reported by specialty area for the nurse practitioners with prescriptive privileges.