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NURSE PRACTITIONER UTILIZATION OF

COMPUTER TECHNOLOGIES IN PRACTICE

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Nurse practitioner utilization of computer technologies in practice was completed as a

project for the requirements for the degree of Master of Science in Nursing at San Jose State

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Abstract

The research demonstrated that nurse practitioners (NP's) underutilized computer applications that would improve client care in their practice. Computer use by NP's in public clinics, private practice, health maintenance organizations (HMO's) and other settings in the greater San Francisco Bay area was described. The descriptive research used a non-experimental design. Subjects were 200 nurse practitioners. The survey instrument was developed by the researcher. Of 104 respondents, 86 (83%) used computers at work. "Obtaining client records from other agencies or departments" was rated the most useful computer application for improving client care. "Internet searches" was rated the next most useful computer application; "entering client record information" was rated the third most useful. Use of computer applications varied by practice setting. Only 7 (25%) NP's in private practice accessed client records from other agencies, as did 17 (57%) NP's in public clinics, and nearly all, 29 (94%) of the NP's in HMO's.

Key Words: Ambulatory Care Information Systems; Computers; Medical Records Systems, Computerized; Nurse Practitioners; Primary Health Care

Introduction

As the 1990's draw to a close, fundamental changes have occurred in health care. In the information technology area there have been product improvements and lower costs. Administrative desire for lower costs, and more efficient and improved client care, has brought information technology within the reach of many health care organizations and providers today.[1]

Some computer systems have reduced nursing time spent on documentation and communication; more research is needed, however, about how nurses use data and information to give effective care.[1] Decisions about patient care may be based on inadequate knowledge, to the detriment of patients. Different areas of nursing, such as family nurse practitioner practice, might not develop needed specialized knowledge if full use is not made of the databases, and other information resources, including the internet, used in informatics technology.[1] Patient care given by nurse practitioners (NP's) is enhanced with adequate use of current specialized information.

The researcher observed a wide range of differences in the use made of information technologies by nurse practitioners. In two health maintenance organization (HMO) settings, nurse practitioners had access to all electronic clinical patient records, such as: patient chart documentation, laboratory, x-ray, pharmacy, and future appointments in various clinical areas. In six public clinic sites observed, nurse practitioners had access to no electronic clinical records at all, and used only the traditional paper chart. The purpose of the study was to describe computer use by nurse practitioners in public clinics, private practice, health maintenance organizations (HMOs) and other settings in the greater San Francisco Bay area.

The research attempted to answer the following question: how is information technology used by nurse practitioners in the greater San Francisco Bay area in public clinics, private practice, health maintenance organizations (HMO's) and other settings. Another survey question asked about home use of computers by nurse practitioners (NP's). The descriptive survey asked which computer applications most improve care: client electronic record keeping, internet use to keep current with new treatment methods, access to records from other departments, communication to other providers, or other uses. Demographic information related to NP's education, specialty areas and years in practice was obtained.

<div align="center">Literature Review</div>

In the early 1990's the need for preparation of nursing students (including nurse practitioners) in the use of information technology was accepted by most nursing educators.[2,3] Nursing Informatics was designated a specialty in 1992 by the American Nurses Association.[4] Arnold described the informatics educational needs and knowledge desired by professional nurses. Differences were found depending on differing work areas between nurse educators, nurse managers, and informatics nurses.[4]

In the late 1990's nursing literature included uses of computers and information technology in a wide variety of areas. Adderley, Hyde, and Mauseth described the transition to a completely paperless record system in a VA hospital, and its positive impact on nursing practice.[5] Cassey, Kane, and Sutton, described a widely available on-line information access system for nursing databases' including the Cumulative Index to Nursing and Allied Health Literature (CINAHL), through the integrated library system in the Detroit area.[6] In cooperation with Wayne State

University Libraries, a common interface to the electronic databases was developed. All library users in the Detroit area can now search nursing databases and periodical indexes for abstracts and citations from all area libraries.[6] Graves described an ongoing conference of advanced practice nurses (APN's) on the World Wide Web. All readers could view the conference, but only NP's and other APN's could take part in the discussions or suggest new topics.[7] These new uses described some of the best uses made of information technology by advanced practice nurses.

According to Goossen, Epping, and Dassen, problems have been found with regard to nurses using electronic patient records and nursing information systems including: limited evaluation research, limited use of information systems, and poor quality of existing systems.[8] Elements that were considered important in nursing information systems were identified by nursing experts from many countries, including need for use of the information across disciplines, and the need to enter data once for multiple use later.[8]

A review of the literature found descriptions of computer information systems. Shepard described finding an internet service provider, and the software and hardware required.[9] Other research described uses made of the internet, such as updating clinical information, or electronic conferencing on the World Wide Web. [7,9] McDonald et al., stated that although electronic medical records systems have long been in use, differently coded clinical data from various computers made the integration of systems difficult. The World Wide Web was proposed as a base to create an ideal clinical information system.[10]

Nursing literature in the late 1990's began to describe the role of the nurse practitioner and other nurses using clinical information systems, and the perceived effectiveness of such use.

Yancey, Given, White, DeVoss, and Coyle, described computerized documentation of a rural

intervention project for cancer care by nurse practitioners.[11] The NP's tracked patient symptoms,

complications, and effectiveness of nursing interventions using a system originally based on the

North American Nursing Diagnosis Association (NANDA) standards, and later customized with

problems relevant to the cancer patients. Advantages found using the system included: a standard

framework using nursing diagnosis, consistency for patient documentation between various sites

and providers, and efficient use of time for client data input, retrieval and quality assurance.[11]

Brazile and Hettinger, described an ambulatory care clinical information system used by

NP's, that included a longitudinal electronic health care record.[12] The system, designed for nurse

clinicians, was multidisciplinary, and could be used by educators, social workers and others. The

clinical record design, one part of the system, used the Nursing Minimum Data Set (NMDS), but

could select from other problem classes or frameworks including the North American Nurses

Diagnosis Association (NANDA), the Omaha System, or the International Classification of

Diseases, 9th Revision. A method to create groups and track data was included. The system

model began as a nurse managed pediatric clinic, and included data on over 500 children.[12]

Another clinical information system under ongoing development was used by The Penn

Nursing Network Information System Project.[13] The system was a collaborative effort of software

developers, academic researchers, and practitioners from various disciplines, including social

workers, and nurse practitioners. The Penn Nursing Network Information System Project used

The Omaha System initially as the organizing framework; other classification choices added later

included the International Classification of Disease's Ninth Edition Clinical Modification

(ICD-9-CM), Diagnostic and Statistical Manual of Mental Disorders (DSM), and Current

Procedural Terminology codes.[13] The system enabled nursing centers, which often serve small

populations, to pool data to be more useful to researchers and outcome evaluation specialists.

National protocols for various conditions such as asthma or hypertension were incorporated into

the system. The system was continually revised after input from clinicians to be of more use in

various settings such as family practice, family planning, gynecological care, and prenatal care.[13]

Spielberg addressed ethical and legal issues relating to computer technologies. New

technologies such as computer use and telemedicine, which includes telephone, video, and

electronic E-mail transmissions via telephone lines or digital connections, provide new ethical and

legal challenges. Spielberg stated that patient confidentiality, informed consent, E-mail as a

medical record, and regulatory oversight when transmissions cross state lines are complex issues

that are only beginning to be addressed by ethical and legal specialists.[14]

Methods

The descriptive research used a non-experimental design. A survey, "Nurse Practitioner

Utilization of Computer Technologies in Practice," (NPUC) was developed by the researcher.

Content of the survey items was reviewed by an expert panel to help assure content validity. The

expert panel consisted of one university educated software programmer and two MS candidates

with knowledge of nurse practitioner and nursing information technology issues. Survey questions

were multiple choice, utilizing 5 point Likert scale. An area was left at the end for additional

written comments. Demographic information including age, years in practice, and previous

computer training was elicited. Survey items asked about the participants' work and home

computer use. Descriptions of computer use by NP's in various practice settings was obtained, including information relating to usefulness of computers for client care.

The participants were nurse practitioners in the San Francisco Bay area in northern California; all were at least 20 years of age. Names of participants were procured from a list of members of the California Coalition of Nurse Practitioners (CCNP) from regions 7, 10, and 19, the Bay area regions. Two hundred names of NP's were utilized, using an alpha sort. Counties that the NP's lived in were San Francisco, San Mateo, San Benito, Santa Cruz, Monterey, Alameda, Contra Costa, and Santa Clara. The survey was mailed to 200 nurse practitioners to their home addresses. Subjects were a convenience sample of the 104 who completed and returned the survey. Institutional Review Board approval for the study was obtained.

Conceptual definitions included the following. Information technology was defined by the researcher as computer equipment and the means to use it. Computer equipment included various types of hardware equipment, such as: computer workstations attached to a company mainframe; personal desktop computers; and laptop computers and organizers. The means to use the equipment included software for clinical use and software that allows retrieval of information sources, such as clinical databases, E-mail, or the internet. Nurse practitioners (NP's) were defined as: "Registered nurses with advanced education and training which qualifies them to provide primary health care, health promotion/ disease prevention services and to manage acute and chronic health problems across the life span."[15] Public clinic was defined as a "'community clinic" or "free clinic" operated by a tax-exempt non-profit corporation that is supported and maintained in whole or in part by donations, bequests, gifts, grants, government funds or

contributions, that may be in the form of money, goods, or services."[16] A free clinic was defined as charging no fee, and a community clinic, as one that charges the client by ability to pay, on a sliding scale basis.[16] The researcher defined private practice as a small office setting, with a small group (less than 12) of health care providers. The private practice office was defined as physicians in collaborative practice with nurse practitioners, or as a nurse managed facility with physicians available on an on-call basis. Health maintenance organizations (HMO's) were defined by the researcher as: organized providers of health care in an integrated system with healthcare service providers, which provide medical benefits and preventive services such as immunizations and health education. HMO plan participants pay prospectively for service rendered. Varying HMO plans might provide any combination of the following: surgical, maternity, pharmacy, eyecare, dental and other benefits.

Data that were obtained were analyzed with descriptive statistics, including frequency distributions, percentages, means and standard deviations. Expanded descriptions of written comments were included.

Results

Of the 200 NPUC Surveys that were mailed, 104 (52%) surveys were returned. The majority of survey respondents had advanced degrees. Educational attainment levels included: 10 (10%) respondents with BS degrees; 86 (83%) respondents with MS degrees, and 5 (5%) respondents with Doctorates. One respondent did not answer this question, and, two others stated in written comments that they were diploma educated, with certificates as NP's. Respondents ranged in age from 20 to over 60 years. Four (4%) respondents were aged 20 to 29 years;

25 (24%) respondents were 30 to 39 years. The majority, 47 (45%) respondents were aged 40 to 49 years, and, 25 (24%) respondents were 50 to 59 years. Only 2 (2%) respondents were more than 60 years of age.

Survey respondents worked in varied locations: 53 (50%) respondents in urban areas; 42 (40%) respondents in suburban areas; 9 (9%) respondents in rural areas; and 1 (1%) respondent worked in two locations. The majority of respondents were very experienced as nurses. Only 10 (10%) respondents were licensed between 1 and 5 years as nurses. All others had 6 or more years experience as nurses: 9 (9%) respondents had 6 to 9 years experience; 31 (30%) respondents had 10 to 19 years experience; 45 (43%) respondents had 20 to 29 years experience; and, 9 (9%) respondents had more than 30 years of experience.

The survey results indicated that 55 (53%) respondents worked between 1 and 5 years as a nurse practitioner. Eight (8%) respondents worked between 6 and 9 years. Thirty (29%) worked between 10 to 19 years; and, 10 (10%) worked between 20 to 29 years as a nurse practitioner. Specialty areas of the NP's varied: 12 (12%) respondents were women's health; 14 (14%) respondents were pediatrics; 41 (39%) respondents were family practice; 9 (9%) respondents were geriatric; 21 (20%) respondents were adult health; 4 (4%) respondents worked in acute care; and, 3 (3%) respondents did not answer the question.

Eighty nine (85%) of the survey respondents worked in three practice settings: 30 (29%) in public clinics; 28 (27%) in private practice; and, 31 (30%) in HMO's. The remaining 15 (15%) worked in other settings. (Table 1). The majority of survey respondents, 91 (88%), were primarily self-taught with regards to computers and computer applications use. Nine (9%)

respondents had a course that was less than 2 weeks. Two (2%) respondents had courses that were 2 to 4 weeks. Two (2%) additional respondents had courses that were longer than 4 weeks.

The majority of NP's used personal, laptop, or network computers at both home and at work: 96 (92%) respondents used computers at home and, 86 (83%) respondents had access at work. Of the 8 (8%) NP's who did not have computers at home, several indicated in written comments that they hoped to purchase computer systems for home use in the near future. Use of computer technologies at home and at work did not vary according to age.

At HMO's, 29 (94%) respondents indicated that they used computers at their work site. Computer use was less frequent at the 2 other major settings: in public clinics, 23 (77%) respondents used computers; 20 (71%) respondents indicated that they used computers in private practice. (Table 1).

Data revealed that computer applications usage varied by clinical setting. Only 7 (25%) nurse practitioners in private practice settings obtained client record information from other agencies or departments, such as pharmacy or laboratories. Seventeen (57%) who worked in public clinics accessed client records from other agencies; nearly all, 29 (94 %) of the NP's who worked in HMO's obtained such client information. The applications used by the largest percentage of NP's in public clinics were word processing, used by 17 (57%), and obtaining client record information from other agencies, used by 17 (57%). Desktop publishing was used by only 1 (3%). The two applications used most frequently during the work day in public clinics were E-mail and obtaining client data from other agencies. (Table 2).

In private practice, word processing was the computer application used by the largest number, 16 (57%) of the NP's; E-mail was used by the next largest number 13 (47%). Word processing and E-mail were the applications used most frequently at work by private practice NP's; desktop publishing was used least frequently. At HMO's, 29 (94%) nurse practitioners obtained client data from other agencies or departments. E-mail was the application used by the next largest number of NP's from HMO's, at 24 (77%). Desktop publishing was used least, by 1 (3%) nurse practitioner in HMO's. (Table 2).

Computer applications were rated for "usefulness in improving client care at your work site" on a 5 point Likert scale. Ranges were the following: 1 = very poor; 2 = poor; 3 = fair; 4 = useful; 5 = very useful. "Obtaining client records from other agencies or departments" was rated as most useful with a mean of 4.56; "internet searches" was rated next most useful with a mean of 4.21. "Entering client record information" was rated the third most useful computer application, with a mean of 4.16. "Word processing" was rated 3.82. "Desktop publishing" was rated least useful for improving client care, with a mean of 2.56. (Table 3).

Ratings for "usefulness in improving client care at your work site" of computer applications did not vary by practice settings, except for one area, "billing or accounting information." "Billing or accounting information" was rated useful by 17 (61%) in private practice with a mean of 4.18 and a standard deviation of 1.19; fair by 17 (57%) in public clinics with a mean of 3.47 and a standard deviation of 1.33; and, poor by 16 (52%) in HMO's with a mean of 2.75 and a standard deviation of 1.44.

Discussion

The survey results indicated that nurse practitioners underutilized computer applications that would most likely improve client care in their practice. Computer usage by NP's varied by practice settings. Computers were used most frequently in HMO's by 29 (94%) NP's, and less frequently by 23 (77%) NP's in public clinics and by 20 (71%) NP's in private practice. Computer applications usage, such as obtaining client medical records, varied by setting.

Nursing literature indicates that "obtaining client medical records from other agencies or departments," and "entering electronic client record information" into electronic medical records, are two very useful computer applications for improving client care. [5,11,12,13] "Obtaining client medical records from other agencies" was rated the computer application most useful for improving client care. It was was underutilized by respondents, except for those in HMO's. Only 7 (25%) nurse practitioners in private practice accessed client records from other agencies or departments, as did 17 (57%) of those who worked in public clinics, and nearly all, 29 (94%) of those who worked in HMO's. Computer systems may not be widely available to NP's in private practice or in public clinics for this application. As one NP noted in written comments, "Computers are not are priority in our private practice---they are used mainly by office staff, not MD's and NP's." These sentiments were echoed by other public and private practice NP's.

"Internet searches" was rated the next most useful computer application by survey respondents; "entering client record information" was rated the third most useful. These two computer applications were underutilized by survey respondents. (Table 2). Entering electronic client record information was used by by only 7 (25%) of the private practice NP's, 12 (40%) of

the public practice NP's, and by 16 (52%) of the NP's in HMO's. The explanation for the limited

use of the applications rated useful for client care may be that these technologies are the most

expensive for health care provider organizations to introduce. These applications are most likely

to be the last computer applications introduced, after billing or accounting, which provides a more

immediate financial return to the organization. It is noted that only the NP's in private practice

rated billing or accounting as useful for improving client care. This may be because the ability of

the NP's to remain employed in private practice is more directly related to the collection of fees

from clients.

The research found the following implications for nursing practice. Benefits obtained from

computer use such as retrieving client record information in a timely manner, communicating with

other agencies, or internet searches, are decreased with inappropriate computer use. Internet

searches are useful for improving care; all nurse practitioners should know how to access the

internet. Computer and applications usage of nurse practitioners varies by clinical setting. Further

study would be useful to determine why such differences exist, how they affect client care, and

how care can be most improved through use of computer technologies.

There were limitations to the research. The nurse practitioners in the sample belonged to the

NP professional organization, and may be more active in the profession than NP's who do not

belong. The sample population may not be representative of the whole NP population. Issues such

as the cost-effectiveness of various technologies were not addressed in the study due to time

constraints. The survey, formulated for this specific study, would need further validity and

reliability studies. Further testing of the survey tool by other researchers would be useful.

TABLE 1

Practice Settings, and Use of Computer at Work Site

Practice Settings	Settings: Frequency	Settings: Percent	NP Uses Computer at Work Site, Frequency; Percent					
			NA		YES		NO	
Public Clinic	30	28.8%			23	76.7%	7	23.3%
Private Practice	28	26.9%			20	71.4%	8	28.6%
HMO	31	29.8%	1	3.2%	29	93.5%	1	3.2%
Skilled Nursing Facility	2	1.9%			2	100.0%		
Home Care	2	1.9%			2	100.0%		
Nursing Education	4	3.8%			4	100.0%		
Not Currently Employed	2	1.9%	1	50.0%	1	50.0%		
NA-Other	5	4.8%			5	100%		
Total N:	104	100.0%	2	1.9%	86	82.7%	16	15.4%

TABLE 2   Computer Applications use, and most frequent use, in 3 Practice Settings

Computer Applications	All applications used at work Percent; Frequency			Two applications most used Percent; Frequency		
	Public	Private	HMO	Public	Private	HMO
Total N= 104	n = 30	n = 28	n = 31	n =30	n = 28	n = 31
Word processing	56.7% 17	57.1% 16	41.9% 13	20.0% 6	39.3% 11	9.7% 3
Spreadsheet	23.3% 7	14.3% 4	12.9% 4	6.7% 2	0.0% 0	3.2% 1
E-mail	50.0% 15	46.4% 13	77.4% 24	46.7% 14	35.7% 10	61.3% 19
Internet searches	46.7% 14	42.9% 12	32.3% 10	3.3% 1	17.9% 5	6.5% 2
Presentation Software	16.7% 5	10.7% 3	19.4% 6	3.3% 1	0.0% 0	3.2% 1
Desktop publishing	3.3% 1	14.3% 4	3.2% 1	0.0% 0	3.6% 1	3.2% 1
Billing or accounting information	20.0% 6	32.1% 9	6.5% 2	6.7% 2	14.3% 4	3.2% 1
Entering electronic client record information	40.0% 12	25.0% 7	51.6% 16	23.3% 7	17.9% 5	32.3% 10
Obtaining client records from other agencies or departments	56.7% 17	25.0% 7	93.5% 29	40.0% 12	10.7% 3	87.1% 27

TABLE 3

Usefulness of computer applications for improving client care at NP's work site

Computer applications:	Frequency N = 104	Mean *	Standard Deviation
Word processing	76	3.82	1.22
Spreadsheet	60	2.98	1.23
E-mail	81	3.77	1.30
Internet searches (e.g., Medline, Cinahl)	76	4.21	1.02
Presentation Software	56	2.87	1.42
Desktop publishing	50	2.56	1.34
Billing or accounting information	55	3.49	1.41
Entering electronic client record information	69	4.16	1.13
Obtaining client record information from other agencies or departments, as pharmacy, labs	77	4.56	0.90

* Rated on a 5 point Likert scale: 1 = very poor; 2 = poor; 3 = fair; 4 = useful; 5 = very useful.

References

1. National Center for Nursing Research. Nursing informatics: Enhancing patient care: A report of

the NCNR Priority Expert Panel on Nursing Informatics. NIH Publication No. 93-2419. May,

1993.

2. Arnold, J., Pearson, G. Computer applications in nursing education and practice. Publication

No. 14-2406. New York: National League for Nursing; 1992.

3. Wright, D.J. The use of multimedia computers and software in nurse education. [On-line].

Health Informatics, 1(3), 101-107. Abstract from CINAHL: Update 9602; August, 1995.

CINAHL Serial Ident: SR0082508.

4. Arnold, J. Nursing informatics educational needs. Comput Nurs. 1996; 14,6: 333-339.

5. Adderley, D., Hyde, C., Mauseth, P. The computer age impacts nurses. Comput Nurs.1997;

15,1: 43-46.

6. Cassey, M.Z., Kane, W.P., Sutton, L.S. On-line access to nursing literature. Comput Nurs.

1993; 1,5: 230-235.

7. Graves, J. Advance practice nurses hold conference on World Wide Web. Reflections. 1996; 2:

29.

8. Goossen, W.T., Epping, P.J., Dassen, T. Criteria for nursing information systems as a

component of the electronic patient record: An international delphi study. Comput Nurs.

1997;15,6: 307-315.

9. Shepard, P.M. Medicine and the internet part I: A primer for going on-line. [On-line]. Clinician

News. 1997; 1,1: 8-10.

10. McDonald, C.J., Overhage, J.M., Dexter, P.R., et al. Canopy computing: Using the web in clinical practice. JAMA. 1998; 280,15: 1325-1329.

11. Yancey, R.., Given, B.A., White, N., DeVoss, D., Coyle, B. Computerized documentation for a rural nursing intervention project. Comput Nurs. 1998; 16,3: 275-284.

12. Brazile, R.P., Hettinger, B.J. A clinical information system for ambulatory care. Comput Nurs. 1995; 13,4: 151-158.

13. Marek, K.D., Jenkins, M., Westra, B.L., McGinley, A. Implementation of a clinical information system in nurse-managed care. Canadian Journal of Nursing Research. 1998; 30, 1: 37-44.

14. Spielberg, A.R. On call and online: Sociohistorical, legal, and ethical implications of e-mail for the patient-physician relationship. JAMA. 1998; 280, 15, 1353-1359.

15. Kentucky Coalition of Nurse Practitioners and Nurse Midwives: Nurse Practitioners, 1998. Http://www.achiever.com/freehmpg/kynurses/nsnp.html .

16. Board of Registered Nursing. Nursing Practice Act Rules and Regulations. State of California Department of Consumer Affairs; 1997:199.