Introduction of Wireless, Pen-Based Computing Among Visiting Nurses in the Inner City: A Qualitative Study

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The purpose of this qualitative study is to understand how a sample of visiting nurses experienced the practice of home health nursing in the inner city and how they perceived the anticipated introduction of wireless, pen-based computing into their practice. Focus groups were held with visiting nurses 1 week before the introduction of the wireless, pen-based computers. The data were analyzed using Strauss and Corbin's (1990) method for concept development. The following central concepts emerged from the focus groups with visiting nurses: "Missing contact in the field," "Consumption of time writing on forms," "Using the computer to help with the practice of home health nursing," and "Home nursing is a lifeline." These concepts, based on the commentaries by visiting nurses, help one to understand the problems encountered by visiting nurses in the delivery of home health care, identify ways to incorporate evolving technologies to enhance nursing practice, and consider approaches to computer skill acquisition.

Advances in technology are transforming health care with dramatic effects on nursing practice, education, and research. Clinicians and students can use the World Wide Web to connect with others around the globe. The nurse can evaluate a patient's vital signs, a radiologist can read X rays, and a surgeon can perform some procedures from miles away with interactive telecommunication devices. Although more nurses are using computer technology, little is understood of how nurses perceive the impact of these technologies on their practice. In this study we describe the concerns, expectations, and insights of a group of experienced community health nurses (CHNs) practicing in an urban environment at the Visiting Nurse Service of New York, just 1 week before the introduction of wireless, pen-based computer technology.

BACKGROUND

Uses of Technology in Home Health and the Community

Technology is playing an increasingly important role in home and community health care. Clinical technologies such as ventilators, once limited to the hospital, are now used for home care. Communication technology has advanced from beepers to sophisticated telecommunication. Complete demographic and clinical information can be rapidly transmitted to a portable computer, accessed, and downloaded. According to Hassett and Farver (1995), visiting nurses in the Washington, DC area are making home visits with a portable laptop computer that is equipped with a modem. Nurses connect the computer to a telephone line and then connect by wide area network (WAN) to the home agency computer to access scheduling information, to communicate with each other, to use electronic bulletin boards, and to obtain in-service education. The nurse's portable computer contains the agency policy-and-procedure manual, medication teaching materials, and the patient's medication profile (Hassett & Farver, 1995).

These point-of-care systems connect a central database with portable terminals that are carried by nurses so that home health care is provided more efficiently and patient information and billing information are transferred with greater speed and accuracy (Hughs, 1995). A small portable terminal system weighing less than 1 lb can support home health documentation, contain patient chart review, store data, and transfer data by modem (Hughs, 1995). Telephone access may not always be available for CHNs practicing in rural communities or poor urban areas, as in this study. A wireless computer overcomes the need for telephone access.

Skiba (1995) described telecommunications as one of the fastest growing industries to impact health care delivery and education: "The development and expansion of the National Information Infrastructure will undoubtedly change the nature of our communications and our access to information and knowledge resources" (p. 40). Telecommunications involve the transfer of voice, data, and video. Over the past decade, innovations in the Plain Old Telephone System have expanded possibilities in home care with group teleconferencing, voice mail, fax machines, picture phones, and computer communication by modem. Telephone communications currently are accessed by patients for health education and to communicate home monitoring of blood sugar levels, for example.

Electronic bulletin boards have been used to form support networks to link patients with each other and providers (Brennan, Moore, & Smyth, 1995; Flaherty, 1995; Hassett & Farver, 1995; Ripich, Moore, & Brennan, 1992; Skiba, 1995). The Cleveland Free-Net, an electronic network that provided services and support for people with AIDS (Brennan et al., 1995; Ripich et al., 1992), was followed by a similar model for caregivers of patients with Alzheimer's disease (Brennan et al., 1995). An electronic bulletin board can be

accessed by health professionals via the Internet to receive and send messages. Rural health professionals across Montana are using the electronic bulletin board to download continuing education files. When a man died of infection with Hantavirus in Montana, the state department of health sent information on the diagnosis and treatment of Hantavirus over the bulletin board so that the information was rapidly available across the country (Flaherty, 1995).

The interactive environment of computer-based health promotion is seen by health educators as an important way to assist people in changing their own risk-taking behavior (Sneider, Walter, & O'Donnell, 1990). For example, a behavioral smoking cessation program has been created to tailor treatment to each participant's smoking history and to the participant's responses to questions asked on the system (Gustafson, Bosworth, Chewning, & Hawkins, 1987). Two-way interactive video for educational purposes can be achieved through coaxial cable, microwave, or fiber optic lines and does not require a satellite. The instructor and audience are linked to several remote classrooms designated as receiver sites. Each participant can see and hear the other (Havice & Knowles, 1995; Witherspoon, Johnson, & Wassem, 1993).

Finally, telehealth is enhancing the delivery of health care to remote access areas nationally and internationally. Computer-based image archiving and transmission systems allow 24-hr access to radiologists who may view and interpret X rays long distance. Audio teleconferencing and slow scan video make possible medical and nursing rounds and in-service education for provider and patient at the Sioux Lookout Zone health care system. Interactive consultation with specialists is available with video, personal computer, fax, and medical telemetry (Witherspoon et al., 1993).

Context for This Study

This qualitative study with 16 home health nurses from the Visiting Nurse Service of New York was part of a larger project funded by the National Telecommunications and Information Administration to evaluate the potential of utilizing existing communication infrastructure, including cellular telecommunications; WANs; and wireless, pen-based computer technology to facilitate the delivery of patient care in the home (Hripcsak, 1994).[1] The goals of the larger study in progress are to streamline the flow of patient information among a large medical center, a visiting nurse agency, and a city public health department and to understand the effects of these technologies on both patients and providers of care (Hripcsak, 1994). The larger study targets a population of patients with

tuberculosis in order to demonstrate the potential of these technologies to improve patient outcomes.

For the introduction phase, a sample of visiting nurses was selected to use a 3.5-lb, pen-based portable computer with a built-in modem compatible with a cellular telephone system in order to reduce the need to use a patient's telephone or a public telephone (Lynch, 1996). The computer was equipped with two-way communication so that the nurses could send out and receive, as well as store and retrieve, patient admission information. The flow of information was as follows: When data are sent electronically to the visiting nurse agency, the data are received and viewed on the remote computer by the visiting nurse in the field. The visiting nurse is able to input admission data collected during the home visit by using a pen that is designed for marking a box on a form that comes up on the computer screen (pen-and-form-based data entry). Data are sent out remotely to the agencies on the network. The nurses can communicate these data only with the agencies and providers who have computers that are included on the network.

The wireless, pen-based computer can accommodate access to the Internet, Medline, and electronic mail so that nurses and the agencies on the network can share information as well as access current patient management guidelines. Once the computers are expanded to include more applications, the patient management guidelines will be driven by automated patient management protocols, as developed by Hripcsak (1994) and others. These automated protocols will help provide safe, state-of-the-art care. For example, when operational, the automated protocols will be triggered by clinical events such as the patient's history of a drug allergy or by potential drug interactions between drugs prescribed for the patient. Another advantage will be that the visiting nurse's assessment of the patient's progress and of any medication side effects can be communicated promptly to the involved agencies, providers, and other nurses included on the network. Data will be transferred between organizations using modern encryption to safeguard patient privacy.

The purpose of this qualitative study with visiting nurses was to evaluate the CHNs' perceptions of the effects that new technology might have on community health care. The qualitative approach was selected to describe and interpret CHNs' perceptions of the problems they currently encounter in home health care before the introduction of technology, as well as their perceptions of the potential impact of wireless computing on their practice.

DESIGN AND METHOD

A purposive sample of 8 visiting nurses who would be using wireless, pen-based computers in the introduction phase of the project and 8 visiting nurses who would not be using the wireless, pen-based computers was approached to participate in the study.

Informed consent was obtained, and all participants received an orientation to the study prior to the focus group interviews. Semistructured questions for focus group interviews were developed in partnership between the faculty from the New York University Division of Nursing and the Visiting Nurse Service of New York.

Broad, open-ended questions were asked to find out what interferes with and what facilitates the practice of home nursing, how the nurses view computers, and the perceived impact of computers on home health nursing practice. The two focus groups were held simultaneously and audiotaped for later transcription. The data from the focus groups were analyzed following the method of concept analysis described by Strauss and Corbin (1990). Categories were developed from the raw data by open coding. Then, using the coding paradigm for axial coding, relations among the categories were identified as (a) the central phenomenon or concept and the properties of the phenomenon, (b) specific conditions required for the phenomenon to occur (i.e., most public telephones were regularly out of order), (c) the prevailing general context or background of the phenomenon (i.e., before the introduction of wireless computing capabilities), (d) strategies taken by the nurses in relation to the phenomenon, and (e) the consequences of the strategies taken by the nurses (Strauss & Corbin, 1990). The axial coding resulted in concepts that were repeatedly compared with the raw data in an inductive–deductive process of asking questions and making comparisons. These concepts were then discussed by us to see whether the concepts captured what each of us had heard in our group. The concepts were also discussed first by telephone with one visiting nurse and then face-to-face with two follow-up focus groups with the same participating visiting nurses for validation.

RESULTS

Central concepts or phenomena that were discovered from the focus groups with the home health nurses were "Missing contact in the field," "Consumption of time writing on forms," "Using the computer to help with the practice of home health nursing," and "Home nursing is a lifeline." Strategies and consequences of these central concepts are described in Table 1.

Missing Contact in the Field

Missing contact in the field emerged as a central concept. The nurses described patterns of repeated unsuccessful efforts to communicate on behalf of patients. *Missing contact* was defined as an unsuccessful attempt to make contact. The nurses' descriptions of successful contact ranged from a single voice contact to arrange another time to speak to advising, informing, notifying, questioning, or reporting from the field. Field was de-

TABLE 1
Concepts Identified From Focus Groups With Nurses

Central Concept	Strategy	Consequence
Missing contact in the field	Doing whatever it takes	The cost of doing whatever it takes
Consumption of time writing on forms	How nurses deal with being stuck on a treadmill	You have to work a very long day
Using the computer to help with the practice of home health nursing	Using the computer as an assistant	Sharing information The time saver The little monster
Home nursing is a lifeline	Compelled to make the right decision	You made the right decision

Note.   Content analysis is adapted from axial coding methods described by Strauss and Corbin (1990).

scribed as the patient's home while riding on the bus, train, car, or en route in the neighborhood.

The nurses described the properties of missing contact in the field as the unsuccessful attempt(s) to make contact with the hospital discharge planning nurse, physician, social worker, occupational therapist, pharmacist, physical and/or respiratory therapist, the patient, family, and significant others. They discussed their need to reach the home health aide agencies if, for example, they go on a home visit and discover that the home health aide is not in the home and the patient has not eaten, has not had medication, or was not bathed. Nurses expressed the fear "What if I had not shown up?" On the other hand, the home health aide, physician, and visiting nurse service may need to communicate with the visiting nurse while the nurse is in the field. "When the home health aide needs me to report a problem, I can't be reached because there is no phone in the home and the pay phones don't work.... I can't answer when I am finally beeped back." Despite the need for immediate contact, the nurses said they hesitate to use a patient's telephone to answer a long-awaited beep about another patient because of their concern for patient privacy. "You never know if the patient you are with knows the patient you are talking about."

The nurses described their need to contact the referring agency because of an incorrect diagnosis on a new patient referral or because of incomplete information such as insurance, social security numbers, or an incorrect address. Nurses talked about the importance of reaching a patient's provider in a timely manner to renew, update, correct, or verify orders; to report a change in the patient's condition or response to treatment; and to obtain an order to discharge the patient when that is appropriate. "I'll be trying to reach the doctor, only to find out the resident is changed, so I was looking for the wrong physician." Nurses were concerned that missing contact in the field might compromise the safety of the patient, and they had concerns about "protecting my license." Nurses questioned, "What can I do to make this situation a safer one?"

Strategy: Doing whatever it takes.   Under these conditions, nurses described the various strategies that they would use to make the contact. These strategies were best expressed as "doing whatever it takes." Strategies of doing whatever it takes occur when the visiting nurse is in the field and needs contact with the physician, home health aide agency, social worker, discharge nurse, or any other member of the health care team, including the patient's significant others, and the attempt to make contact is aborted. The visiting nurse has missed contact in the field and will do whatever it takes to make the contact.

Doing whatever it takes strategies include purchasing a cellular phone at the nurse's own expense and working at home until late at night "trying to wrap up the day's crisis." The main benefit of using the cellular phone at the nurse's own expense was "instant communication." Doing whatever it takes as a strategy also meant the expense of time and money to make long-distance phone calls from home.

The strategy of leaving several messages and not giving up is often used. The nurse will seek out the physician by going to the clinic or office in person. "I have had to make personal visits to the clinic just to get orders signed for a recertification. I have spent several hours waiting." Another example of a doing whatever it takes strategy devised by nurses when they miss contact in the field is to leave notes for other home care providers in the patient's home.

Consequence: The cost of doing whatever it takes.   If these strategies to make contact fail, the consequences could be serious. These include insurance companies denying a patient coverage for home care so that home care is not received, home care is cut off, or there is a lapse or delay in home care services. The denial or discontinuity of care may compromise patient safety, and the lack of proper orders may compromise legal practice. Consequences of purchasing a cellular phone to make contact include incurring personal expenses. Nurses described a consequence of doing whatever it takes to get a doctor to sign orders as "humiliating." Another consequence of doing whatever it takes was time taken from patient care. Nurses viewed many of their strategies as nonnursing functions. On the other hand, the success of their strategies included optimal patient care, prompt nursing services, and a sense of professional satisfaction.

Consumption of Time Writing on Forms

Consumption of time writing on forms is another central concept that emerged from content analysis of the focus groups. Visiting nurses described how they filled out patient admission forms, daily care plans, 60-day order renewals, insurance reimbursement

forms, and forms to initiate home health aide services and other services such as physical therapy. The nurses felt the required information was redundant and "should come up automatically for you." The nurses described the consumption of time writing on forms as being "stuck on a treadmill." They described the redundancy in writing and rewriting the information at regular intervals on several forms for several agencies, and they even found redundancy within each form. This theme was captured by one nurse's comment, "We don't waste time, we consume it."

Strategies: How nurses deal with being stuck on a treadmill. Nurses provided vivid descriptions of their strategies to deal with writing on these forms. When a visiting home health nurse is consuming time writing and duplicating required information at regular intervals on forms for one or more agencies and for each patient, the nurse will solve the problem by writing and completing the forms during the patient visit, by taping the patient visit while still in the home and writing later, or by repeating the information by memory into a tape recorder while in his or her own car and writing on the forms later; as one nurse said, "I pay two dollars a page" for a secretary to transcribe the audiotapes. One nurse said, "My way of surviving is that this is a 9-to-5 day," whereas another nurse found her best strategy was to complete the paperwork at home. Nurses also helped each other by arranging to meet at the end of the day and having one nurse carry the paperwork back to the main office.

Consequences: You have to work a very long day. The consequences of either success or failure of visiting nurses' strategies for dealing with consuming time writing on forms included meeting the deadline and initiation or continuation of services, or rewriting forms if there were any errors or if the forms were received late with potential disruption of services. Nurses reported the difficult consequences of working an extra-long day to complete forms.

Using the Computer to Help With the Practice of Home Health Nursing

Using the computer to help with the practice of home health nursing was a central concept that captured nurses' perceptions of oncoming computer technology. Their anticipated uses of the computer were described as solutions to the problems they identified. Although nurses had varying levels of exposure to computers, most nurses were novice users. Some previously had used computers in the hospital for medication or for other data entry; others previously had used only a printer. One nurse had worked at an agency during the

transition from a manual to a computerized system. Computer training took place on-site. This nurse reported that at first, "Everyone was hysterical, thought it was going to be the worst thing that could ever happen. Once everyone was trained, it was great! Things ran much more smoothly." Others described problems: "When the system was sluggish and wouldn't accept information, it was hard." Another nurse was resigned: "It's in the cards." One nurse had more extended experience with computers and had a CD-ROM with lists of drugs, drug interactions, and patient information. Roughly half the nurses had computers in their homes, and most of these nurses expressed that it was a family member who was the primary user of the home computer.

Access and control over information.   Several properties of using the computer to help with the practice of home health nursing emerged from the data. These were described as access and control over information. To accomplish access and control over information, several nurses said they needed a full display of the information currently found on a cardex system. Nurses wanted connectivity to share information with agencies and an "automatic printout" so that they would only need to fill in "whatever extras." Nurses wanted the ability to make a partial entry without rewriting the whole report and the flexibility to open a file and return to it whenever necessary. They wanted to be able to see the data when they were input by physicians, laboratories, insurers, and the visiting nurse agency. The nurses did not address the limitation that only those agencies included on the computer network could share data. They wanted the database both in the office and on their wireless computer. Several of these nurses repeated the need to see and verify the data they input before it is sent out. Nurses said they wanted the patient's chart to be accessible to them while they were in the field in case the information was required, and they wanted new referrals to come up on the computer. Several nurses said they wanted a system that still protects everyone as well as a system that "doesn't destroy what you've worked for with a delete button."

The strategy of using the computer as an assistant.   The computer as an assistant emerged as the key strategy for using the computer to help the practice of home health nursing. Under the conditions of varying amount of exposure to computers, visiting nurses wanted access and control over patient information and saw the computer as an assistant to help with the practice of home health nursing. They saw the computer as an assistant that should be able to build up a database with patients' medications, updated lists of providers, care plans, and a list of community resources containing addresses and telephone numbers. They wanted the assistant to help organize by keeping a telephone book, calendar, and itinerary. They wanted the computer to help with patient teaching by printing drug information that the nurses could hand to patients, and they wanted the

computer to translate the patient education material into Spanish, Korean, and Russian because of the demographics of the different communities served. The nurses wanted to use the Internet to update their knowledge on pharmacology programs that include generic drugs as well as side effects of medications in order to help with their assessment of patients. They also wanted a reference on nutrition. The nurses wanted the computer to help them order supplies; however, they feared that this technology might lead to displacement of workers' jobs. They wanted to "plug the computer in" and be able to access the entire report of the new case instead of the bare basics currently provided over the telephone. They envisioned an electronic bulletin board that would allow them to connect with each other to "give each other support."

Consequences: Sharing information, the time-saver, and the little monster.

The nurses anticipated several consequences as a result of their plan to use the computer as an assistant. These included sharing of information, the computer as a time-saver, and the computer as a little monster. Under sharing of information, nurses viewed the possibility of more complete referral information at their fingertips as "a joy." They hoped they would no longer need to conduct referrals by telephone. They expected that the printouts would reduce redundancy of vital information and reduce phone calls to the pharmacy.

The computer as a time-saver was another perceived consequence of their plan to use the computer as an assistant. The nurses imagined that if the 60-day summary were done on computers, time would be saved. They hoped that instead of "writing continuously" and duplicating information, they could just add new changes. The nurses felt they could "concentrate on patient care," "have more time to do a thorough care plan," and cut down on repetition in the reports. Nurses felt that the remote, pen-based computers would increase efficiency and improve the flow of information.

On the other hand, the computer as a little monster also emerged as a perceived consequence of using the computer as an assistant strategy. The nurses felt that the computer was "beautiful for some but has pluses and minuses." The nurses expressed concern about receiving adequate training. They expressed distrust that the computer would lose records and that the technology would ultimately result in layoffs. "I hope there is retraining for those jobs eliminated by technology." The comments "You need your job ... computer skills now become a part of it" and "We used to be just good nurses" reflected the idea of the computer as a little monster. A few nurses expressed nostalgia for the old days. A nurse replied, "No choice, its already out there." Some of the nurses believed they would still need to carry around "a lot of paperwork." Others were concerned that someone would need to be available to repair the computer. Fear of accidentally losing information was expressed by one nurse as "this little monster that we've humanized has eaten up your records." There was concern about losing the portable

computer. Nurses expressed fear for the loss of confidentiality, especially with patients infected with HIV.

Home Nursing Is a Lifeline

The nurses communicated the importance of their visits to the patient. They felt as if they were "it out there." They described the concern "What if I didn't show up?" "All these little people out there" opened up a new category that specifically addressed the nurses' concerns for the vulnerability of some patients in the home. The nurses voiced repeated concern over the effect of current cutbacks in patients' benefits. They felt these services were desperately needed: "You just keep them from falling over the edge, you're their lifeline, you're it." The nurses described "one thing each day is scary." The concept of home nursing is a lifeline captured nurses' perceptions of their responsibilities to the survival of patients in the home.

Strategy: Compelled to make the right decision. The nurses had to devise strategies to deal with the responsibilities implied by home nursing is a lifeline. Nurses felt compelled to make the right decision. The strategy of being compelled to make the right decision meant "you spend your weekends worrying about certain people" or that hours were spent in the person's home talking him or her into going to the emergency room. The nurses' strategy also included closely working with the patient's family and with home health aides. They visited fragile patients several times a week.

Consequence: You made the right decision. A consequence of the nurses acting on the feeling of being compelled to make the right decision was an enormous feeling of professional satisfaction "that you made the right decision." One nurse illustrated this when she saw her decision supported by other health care providers. They felt gratified when, on their encouragement, the patient went to the emergency room and was admitted. "You do a good job and somehow that means something." In contrast to the discussion of consumption of time writing on forms, the nurses were obviously enthused by "weeks that you begin to see things happen." On the other hand, nurses remarked that if the patient were denied access to home care—the lifeline—safety was compromised.

DISCUSSION

The concepts of missing contact in the field and consuming time writing on forms are supported by Hassett and Farver's (1995) analysis of communication problems and

paperwork burdens in home health care. The group of CHNs in our study anticipated that the introduction of cellular computers would help them to overcome these obstacles. Using the computer to help in the practice of home health nursing reflected the nurses' expectations that cellular computing could perform many of the tasks needed to solve missing contact in the field in a poor inner-city community and that cellular computing would reduce the consumption of time writing on forms.

The nurses' description of doing whatever it takes when they miss contact in the field is a strategy that includes exhaustive effort and sacrifice to make contact. This group of CHNs anticipate utilizing wireless, pen-based computers as a way of expanding and improving their existing arsenal of strategies. This finding adds new dimension to the change theory model. Lorenzi and Riley's (1995) discussion of change theory as a conceptual basis to the introduction of computers among nurses is based on the anticipated need to overcome nurses' resistance to computers. Our study suggests that nurses may indeed welcome and not resist a tool that they perceive to expand their arsenal of strategies to overcome problems.

The nurses' professional satisfaction is reflected by the concept of home nursing is a lifeline. This last concept should be probed further as it may help one understand the essence of caring that balances the challenges of community health nursing. The nurses anticipated that if technology increased efficiency, they could devote more time to what they considered central to home health nursing.

Our study suggests that CHNs would be willing to use cellular, pen-based computing and that the agencies might benefit from the cost savings of such systems. A limitation of cellular, pen-based computing is that the nurses can exchange patient data only with agencies and providers who are linked to the network.

A study by the Visiting Nurse Service in four different states, including an urban community, tested the Omaha System as a model to document and measure data on patients' health needs, nursing services delivered, and the outcomes of the nursing care (Martin, Sheet, & Stegman, 1993). The system demonstrated positive patient outcomes for community health nursing. Our study adds insight to how a group of CHNs can employ creative strategies, do whatever it takes to overcome obstacles, and achieve positive outcomes.

Missing contact in the field is a concept centered in communications, a fundamental domain of nursing. This group of experienced CHNs poignantly identified communication problems in the urban setting. Hassett and Farver (1995) suggested that analysis of an agency's present information flow should begin with identifying priorities and redundancies within the work flow. The focus groups with CHNs helped to identify these areas.

It may be useful to compare the findings of using the computer to help the practice of home health nursing or the computer as a monster with results obtained from existing surveys that measure the impact of oncoming technology in nursing practice in hospital settings (Scarpa, Smeltzer, & Jasion, 1992; Stockton & Verhey, 1995; Stronge & Brodt,

1985). The findings of this qualitative study add contextual and descriptive information to these more frequently administered quantitative studies that measure nurses' attitudes toward computerization or measure improvement in nursing care. For example, the Stronge–Brodt Nurses' Attitudes Toward Computers Questionnaire (Stockton & Verhey, 1995; Stronge & Brodt, 1985) was designed to measure nurses' self-reported attitudes toward computers in six key areas: job security, legal ramifications, quality of patient care, capabilities of computers, employee willingness to use computers, and benefit to the institution. Scarpa et al. (1992) used this tool to survey hospital nurses and found that nurses' attitudes were generally favorable toward computers. They also found that previous experience with computers was the only variable significantly related to more favorable attitudes. Similarly, a study measuring work excitement among computer users (Ngin, Simms, & Erbin-Roesemann, 1993) showed that nurses who already used computers considered the computer a nursing technology capable of making their work easier and were excited by the experience. Most of the visiting nurses described in our study were novice computer users who anticipated that the computer would be an assistant to help with the practice of home health nursing. The nurses perceived that their strategy to use the computer as an assistant would be a time-saver and would increase access and sharing of information. This perception concurs with the studies that measure the improvement of nurses' performance with computers (Minda & Brundage, 1994; Staggers & Mills, 1994). Nurses anticipated the lurking potential for the computer as a monster as they envisioned computers breaking down and losing information, and they feared that they would not receive enough training or that using the computer as an assistant would replace coworkers' jobs. More focus groups are needed to continue to explore these themes.

IMPLICATIONS

In *From Novice to Expert,* Benner (1984) used an interpretative approach to more fully comprehend nurses' descriptions of their clinical practice. Benner found that expert nurses "just know" when the patient is sick, takes a turn for the worse, or improves. "The clinician's knowledge is embedded in perceptions rather than precepts" (p. 43). Experienced CHNs offer valuable insights concerning patients' health care needs, obstacles to nursing care in the home, and recommendations for applications of technology. The applications of technology and technology training should be tailored to enhance the practice of the nurse as the end user of computer technology. Further, these qualitative data reflect an eagerness and receptivity to new technologies that are perceived to enhance professional practice. These concepts are the background for the anticipated arrival of wireless computing in the practice of CHNs in the urban environment. The CHNs anticipated using the computer to help with the practice of home health nursing. Focus

groups helped to bring contextual understanding of visiting nurses' views toward oncoming computer technology in this rapidly growing field.

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