

White Paper ■

## The Challenge of Meeting Patients' Needs with a National Nursing Informatics Agenda

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**Abstract** Information has become a capital good and is focused on outcomes. Clinical guidelines are being developed to standardize care for populations, but patient preferences also need to be known when planning individualized care. Information technologies can be used to retrieve both types of information. The concern is that nurses are not adequately prepared to manage information using technology. This paper presents five strategic directions recommended by the National Advisory Council on Nurse Education and Practice (Department of Health and Human Services, Division of Nursing) to enhance nurses' preparation to use and develop information technology. The recommendations are 1) to include core informatics content in nursing curricula, 2) to prepare nurses with specialized skills in informatics, 3) to enhance nursing practice and education through informatics projects, 4) to prepare nursing faculty in informatics, and 5) to increase collaborative efforts in nursing informatics. The potential impact of these strategic directions on patients is discussed.

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Information has become a capital good that is increasingly focused on outcomes. To achieve desired outcomes, clinical guidelines are being developed to standardize care for populations of patients. There is also a need to consider patients' preferences for possible outcomes when making care decisions with them.<sup>1</sup> Current information technologies should allow documentation of both clinical guidelines and patients' preferences for planning care. The concern is whether nurses and patients can use information technologies

adequately to access the information they need to make appropriate care decisions. This paper presents five strategic directions to enhance nurses' preparation to use and develop technologies for managing information, reviews studies that support the strategies, and explores potential benefits of the strategies for patients.

### Building the National Infrastructure

In the United States, government initiatives have been implemented to increase the availability and use of information technologies in all economies, including health care. Three major federal initiatives concern the information infrastructure, the Internet, and telemedicine.

The national information infrastructure (NII) initiative focuses on enhancing the basic infrastructure for telecommunications and computer technology in all sectors of the U.S. economy.<sup>2</sup> The NII will provide a seamless web of communications networks, computers, databases, and consumer electronics. Patients and providers will have access to large amounts of information. The NII will enable providers to gain greater knowledge of effective treatments, suggest alternative technologies, and facilitate joint decision-making with patients.<sup>3</sup>

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An integral part of the NII is the Internet. The importance of the Internet is reflected in the Next Generation Internet initiative. This federal initiative will connect universities and national laboratories with high-speed networks that are 100 to 1,000 times faster than our current Internet system and promote experimentation with new applications and network technologies.<sup>4</sup> The initiative is expected to produce technologic advances with the potential to expedite collaborative health care research across the world and result in new technologies that facilitate information exchange for patients and providers.

The third federal initiative focuses on using telemedicine or telehealth technologies. Telemedicine is the use of telecommunication technologies to provide health care at a distance.<sup>5</sup> More broadly, telehealth refers to community health education, health providers' education, public health, research, and health services administration using telecommunications technology.<sup>6</sup> In the United States, the National Library of Medicine of the National Institutes of Health<sup>7</sup> and the Office of Rural Health Policy of the Health Resources and Services Administration<sup>8</sup> are two agencies that support telemedicine projects. New legislation that requires providers to be reimbursed for telemedicine services to Medicare patients living in designated health-professional shortage areas<sup>9</sup> is expected to increase the use of these technologies. As a result local access to health and education services should be improved. The outcomes of these initiatives will influence the Healthy People 2000 initiative, which proposes, for the general population, to increase the span of healthy life, reduce health disparities, and provide access to preventive services.<sup>10</sup>

### Strategic Directions for Nursing

Through its National Advisory Council on Nurse Education and Practice, the Division of Nursing, a unit within the Health Resources and Services Administration of the Department of Health and Human Services, has identified nursing informatics needs and proposed strategic initiatives to prepare the national nursing work force to use information and information technologies more effectively. The Division of Nursing has taken the position that information technologies will facilitate the development of an adequate supply of qualified nurses and the distribution of health care services where they are most needed by patients.

The Division of Nursing has recognized the importance of nursing informatics in meeting the public's health needs and has funded projects since 1972, but the nursing work force continues to need to develop

informatics skills. As a result, the Advisory Council commissioned a panel of experts to set strategic directions for nursing informatics. Nineteen experts in nursing informatics, the National Nursing Informatics Work Group, gathered from across the United States for this purpose. Work group members are recognized for their outstanding contributions to nursing informatics in practice, industry, government, and education. To broaden the panel's informatics perspective one member is a nurse practitioner and one member is a non-nurse. Members' areas of expertise include decision support, distance learning, informatics education and competencies, information systems, language and taxonomies, and telecommunications.

A nominal group technique was used to elicit initial informatics needs and strategic initiatives from work group members. Consensus and prioritizing procedures were used to produce the final lists of informatics needs and strategic directions.

Five beliefs foundational to all further discussion of nursing informatics were identified:

- Learners are students, faculty, and clinicians.
- Nursing informatics is within an interdisciplinary context of partnerships and collaboration.
- Efforts should target disadvantaged and underserved populations.
- Initiatives should be sensitive to other funding priorities.
- Collaboration is necessary for federal agencies and between federal and public entities.

Through discussion and collation, work group members identified strategic directions for the Division of Nursing, which were submitted to the Advisory Council for approval. The resulting strategic directions for informatics in nursing education and practice that will be sent to the Secretary of Health and Human Services are as follows:

- Educate nursing students and practicing nurses to achieve core informatics competencies.
- Prepare nurses with specialized skills in informatics.
- Enhance nursing practice and education through informatics projects.
- Prepare nursing faculty in informatics.
- Increase collaborative efforts in nursing informatics.

### Data That Support Strategic Directions

To describe the state of nursing informatics, an extensive review of research literature published from January 1990 to April 1997 was conducted. The review focused on information and technology skills of nursing students, nursing faculty, and practicing nurses; use of computers; and availability of computers and applications in education and practice. Information about the state of the public's computer skills was also sought.

Several implications about informatics were drawn from literature. First, technology is available in schools of nursing, but infrastructure support in terms of personnel, planning, and budgeting often is not. Second, the acceptance and use of technologies as basic tools for information management and exchange need to be promoted within nursing. Third, more nursing informatics educational programs are needed. Fourth, many practicing nurses lack computer competencies. Fifth, the public is interested in accessing health information from the Internet. Sixth, disadvantaged and underserved populations are less frequent retrievers of information from the Internet.

Rossel<sup>11</sup> and Carty and Rosenfeld<sup>12</sup> found that almost all schools have access to computers, printers, and library searches, but not all are connected to a network. Although they have computers, half the nursing schools studied allocate no moneys for a network manager, technology personnel, or a technology planning committee. When available, technology budgets are very modest.

Even though computers are available in schools, use of the technology is not routinely included in nursing curricula.<sup>12-14</sup> Educators have speculated that nursing schools do not have to be concerned about the computer skills of incoming students, but data do not support these speculations. Most public schools offer microcomputer services, but only one third have computers with modems. Schools with more than 20 percent minorities are even less likely to have modem connections available to them.<sup>15</sup>

Given the relative availability of computers, the question is whether incoming nursing students have the skills they need to use information technology effectively. Data show that nursing students have access to computers starting in primary and secondary schools but have limited ability to use them for tasks other than word processing.<sup>16-18</sup> Only Saba<sup>19</sup> found that nearly all incoming students are computer literate.

There is a need to know whether faculty are prepared to help students and patients use computers and the NII. The Southern Council on Collegiate Education for

Nursing<sup>20</sup> determined how nurse educators are using educational technologies. Sixty-six percent of nursing schools have access to the Internet, but half of those make that access available to only a few faculty members. Access to bibliographic databases for information retrieval is more widely available. Faculty development occurs through individual troubleshooting rather than through organized training or workshops.

Arnold<sup>21</sup> found that the majority of nurse educators, administrators, and informaticians have computer access at home or at work, or both. Even though a large group of informatics specialists was included in the sample, software usage was predominantly for word processing. Half the group used e-mail, but less than a third used the Internet.

The number of nurses prepared to work in the specialty of informatics is unknown. What is known is that most informatics nurses have prepared themselves to work in the field through job experiences, continuing education, and self-study.<sup>22-24</sup> Few nursing schools prepare specialists in informatics.

Data show that practicing nurses have very little experience with computers.<sup>25</sup> Patterson et al.<sup>26</sup> found that even though more than half their nurses believed computers would improve the continuity of care, only 10 percent of these preferred the computer to more traditional methods of information exchange. Reasons for the preferences were not listed.

### Impact on Patients

#### Strategic Direction One

The first strategy in nursing's informatics agenda is to include core informatics skills and knowledge in nursing undergraduate, graduate, and continuing education programs. All nurses will need to have core informatics competencies to practice effectively in the next millennium. Core computing skills include the ability to use word processing, e-mail, spreadsheets, databases, bibliographic retrieval, the Internet, the World Wide Web, and presentation graphics software. In addition, all nurses must be able to collect and record data using information technologies, analyze and interpret information needed to provide care, and implement policies related to privacy, confidentiality, and security of information.<sup>27</sup> Added informatics knowledge of decision-making, information management, standard nomenclatures for nursing language, and informatics roles should be integrated into nursing programs.

As more patients use information technology in their daily lives, they will expect nurse providers to have

at least the same skills in using information technologies to share health information. Consumers like Brown's HealthMed Retrievers<sup>28</sup> are likely to increase in numbers and demand more sophisticated health information through the Internet. Nurses will need to be able to respond to these demands. In fact, nurses may find that their patient education encounters will increasingly occur through distance technology media. For example, as patients experience the benefits of using telehealth technologies, they may become reluctant to travel large distances to gain information about their diabetes or cardiac disorders and may ask to have telehealth consultation visits that are conducted in local community centers.

With increased use of technology by both patients and nurses, the general health-information needs of communities could be assessed systematically and matched with available technology resources. A better match of information needs and resources would promote the use of appropriate and cost-effective telehealth technologies for community health education. Patients who are unfamiliar with information technologies may want to learn how to use them. Nurses will need to be prepared to provide that instruction as a routine part of patient education.

Patients will also expect nurses to use technologies to access information about their medical conditions and will be less willing to repeat medical histories. Even though electronic data exchange will increase, nurses and other providers will be expected to keep patient data secure and confidential. Including core informatics skills in all nursing curricula will prepare nurses to use information technology more effectively and help them meet patients' expectations for information handling.

### **Strategic Direction Two**

The second strategy in nursing's informatics agenda is to fund creative informatics programs that teach nurses specialized informatics skills. Such skills will prepare nurses, in collaboration with other informaticians, to develop and implement information systems that support the national health goals of offering accessible, quality, and cost-effective care. Nurses with specialized informatics skills will be prepared to help solve issues of interdisciplinary standardized language, connectivity, hardware, human-computer interface, and security that are pertinent to information technology.

Increasing the number of nurses prepared as specialists in informatics would open the way to important benefits for patients. New technologies that are

cheaper, more flexible, and easier to use might be developed for patients. For example, hand-held pen technologies rather than more traditional computers could serve as effective input devices for patients.<sup>29</sup> Data could then be aggregated and used to help nurses and patients make evidence-based care decisions<sup>30</sup> that conform with patients' preferences for outcomes. Nurses with specialized informatics skills could help design computer interfaces that accommodate patient's physical limitations, such as decreased vision or loss of finer hand movement.

With additional nurses having specialized skills in informatics, it is more likely that interdisciplinary, standardized languages that represent nursing practice will be encompassed in information systems. With the use of representative and standardized languages, patients' data can more easily be collected directly from their source and shared between systems as needed for care. Standardization will facilitate the capture of measures of patients' outcomes from different technologies, such as mark-sensitive forms, monitors, and automated telephone systems.<sup>31</sup> Easier capture and aggregation of patient data are likely to increase the availability of decision-support tools to help patients make more informed judgments about their care.

### **Strategic Direction Three**

The third strategy in nursing's informatics agenda is to fund innovative, collaborative telecommunication projects that will enhance the quality of clinical practice for populations at risk and contribute to the education of health care providers. Many children will benefit from a project that connects nurse practitioners from school-based clinics in rural, underserved communities with supervising physicians in remote urban centers, enabling the providers to deliver preventive care across the school-aged population's life span. Immunization, screening, consultation, and treatment for identified problems can be provided through such a project.

An example of a project that can benefit patients indirectly is one that focuses on the education of nurses by establishing collaborative nursing informatics laboratories within a geographic region. These laboratories can provide informatics learning opportunities for nurses practicing in disadvantaged and underserved areas without requiring them to travel to distant locations. The nurses will experience less financial strain, have more opportunities to increase informatics competencies, and benefit from enhanced communication. Patients are likely to benefit because their

nurses are better prepared to access the information they need to make decisions about their care.

Telemedicine projects frequently link physicians in urban and rural sites for patient consultation. Nurses have assisted with patients at the transmitting sites but generally have not used the technologies themselves to provide follow-up consultations or patient education. For example, patients with serious illnesses can use telehealth technologies to maintain contact with "their" nurses to clarify discharge instructions. Older patients with few or no support persons at home can also benefit from using telehealth technologies to exchange information with nurse providers.<sup>32</sup> Devices can be combined with telecommunication technologies to remind patients to take medications or adjust drug dosages. And desktop videoconferencing can help nurses recognize symptoms that may be ignored, allowing earlier and less expensive treatment interventions.

#### **Strategic Direction Four**

The fourth strategy in nursing's informatics agenda is to increase nursing faculty preparation in informatics through the use of innovative programs. Because a limited number of nursing faculty are trained in informatics, schools need to use technologic and collaborative approaches to equip additional faculty with informatics skills. Through collaborative programs nursing schools within a region could offer faculty development in either core or specialized informatics skills. Core skills focus on basic information management using technologies. Specialized informatics skills include language development, decision-support technologies, human-computer interface issues, and clinical system development and implementation.

Nursing schools might also choose to link with existing informatics programs to allow selected faculty to earn informatics degrees or certificates using telehealth technologies. Using another approach, supervised self-study modules could be developed for faculty to use at home. Learners from different sites would be linked so that they could learn collaboratively.

Increasing nursing faculty preparation in informatics would directly benefit those patients receiving care from faculty engaged in clinical practice. Most benefits, however, would be realized indirectly. If information technology were used routinely by faculty, students would be more likely to adopt technologies enabling patients to enter health screening data at their leisure, receive reminders of appointments, re-

view information about procedures, and share information with their providers.

#### **Strategic Direction Five**

The final strategy in nursing's informatics agenda is to facilitate the advancement of informatics in nursing through public and private organizations working together. In an environment of increasing information needs and decreasing dollars, collaboration is needed to maximize accessible resources. Developing such methods as Web linkages for sharing information about available resources will help nurses locate funding for creative ways of using information technology to meet specific public health care needs. If solutions improve access to health information and care, individuals might be helped to avoid preventable diseases, accomplishing objectives of the Healthy People 2000 initiative.

One of the major concerns in nursing informatics is language development. Collaborative efforts may help advance nursing informatics by facilitating the development and refinement of the language needed to represent nursing practice. If these efforts also provide the means for the languages of all health care providers to be linked, patients would be likely to benefit from simplified data collection and retrieval.

### **Conclusions**

The Division of Nursing, through its National Advisory Council on Nurse Education and Practice, has recommended five strategic directions that will better prepare the nursing work force to adopt and use information technology as a basic tool for information processing. Nursing schools need to provide core informatics content to students. Some nurses need to have specialized informatics skills that prepare them to assist other disciplines in solving informatics issues. Telecommunication projects are needed to strengthen the delivery of nursing care in underserved areas. More nursing faculty need to be prepared in informatics to help students learn these skills. And finally, increased collaboration is needed to facilitate the advancement of informatics in nursing.

Patients are expected to benefit from these initiatives both directly and indirectly. Telehealth projects can directly affect patients by providing education and counseling. Telemedicine projects can enable patients to receive care in remote areas from nurse practitioners. Patients will benefit indirectly from expanded use of technology by nurses. Easier access will facilitate

information exchange between nurses and patients and encourage joint decision-making about care. Although the increased use of information technology should be beneficial to patients, issues such as data security will become more pressing. If nurses are adequately prepared to manage patient data using technologies, these difficulties can be minimized.

Nurses need to enter the next millennium better prepared technologically as information managers. The proposed agenda is viewed by the Division of Nursing as a first step in meeting that challenge.

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