Nebraska Drug Information Network: An Educational Model for Community Sites

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This descriptive report outlines the inception and development of the Nebraska Drug Information Network in community pharmacies and its use in the experiential component of the curriculum. The Network serves as a model for utilizing information databases to support the pharmacist's role in delivering pharmaceutical care. Multimedia and textual software and hardware are provided to each Network site promoting patient education and delivery of technical information to other health care colleagues. Software is also provided to allow pharmacists to document pharmaceutical care interventions and associated outcomes. Each Network site serves as a clerkship site for pharmacy students. Hence students are taught how to use these resources to implement pharmaceutical care and how to document such activities. The Network can serve as a model for other pharmacies who intend to implement the pharmaceutical care paradigm. It can also serve as a model for other colleges of pharmacy who face the challenge of educating pharmacy students to assume an expanded role of the community pharmacist delivering pharmaceutical care.

RURAL EDUCATIONAL MODELS AND PHARMACEUTICAL CARE

Pharmaceutical care, as defined by Hepler and Strand, is the provision of drug therapy for the purpose of achieving outcomes which improve a patient's quality of life(1). When applied to everyday practice, this translates into pharmacist review of the patient's drug regimen for interactions, adverse effects and duplicitous therapies. It includes educating patients regarding their drug therapy to improve their understanding and hopefully compliance with their regimen. Monitoring drug therapy with measurable outcomes (*e.g.,* blood pressure) should also be conducted by the pharmacist. Pharmaceutical care also means integrating the pharmacist's personal knowledge of the patient in the context of their illness and approach to health care. For example, the pharmacist who has known Mr. Jones for 30 years as a stoic individual with a low regard for medicine and drugs, will recognize the potential for noncompliance and the need for a simplified drug regimen that minimizes the number of daily drug units. Optimal pharmaceutical care delivered by a personal pharmacist will address drug therapy, not in isolation, but rather in the context of the patient's comprehensive health care.

Pharmaceutical care delivered in rural areas is a critical element of health care in those communities. The health status of rural citizens is less favorable than their urban counterparts. Rural citizens are in poorer health, represent a disproportionate share of individuals living in poverty and are less likely than urban residents to have health care services covered by Medicaid(2,3). Over 25 percent of rural Americans lived in or near poverty in 1987 and fewer had private insurance than their urban counterparts (73.9 and 81.5 percent, respectively)(2). These rural citizens, perhaps due to poorer access and ability to pay, are in poorer health and have a high prevalence of chronic illness and disability(2-5). Their access to care is limited with one out of 17 rural counties nationally having no physician providing care in 1985(2).

Nebraska is primarily a rural state with approximately half of the State's 1.6 million population located in two cities (Omaha and Lincoln), with the remaining half of the population residing in the 77,227 square miles constituting rural Nebraska. Fifty-seven of 99 Nebraska communities have a shortage of family medicine physicians, hence their access to health care is limited. In many of these communities, the pharmacist is the only health care professional who is consistently
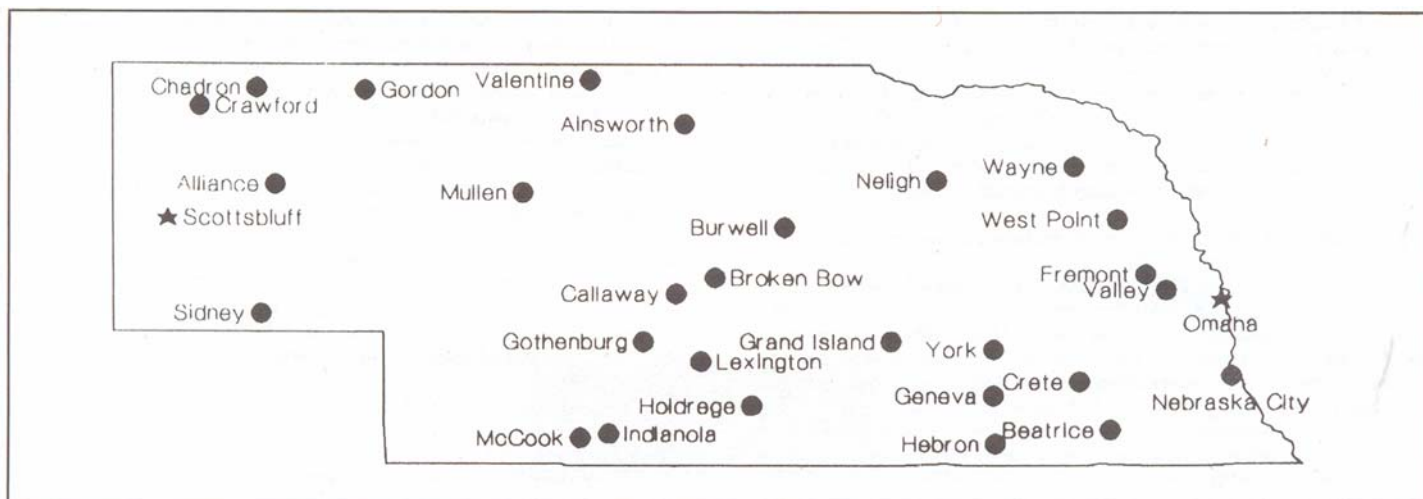
Fig. 1. Sites of the Nebraska Drug Information Network as of November, 1995.

available to the patient. Concomitantly, the elderly population which constitutes 17 percent of the rural Nebraska population is increasing. The elderly require more health care services and access to health information than is required in the general population. This population also takes more drugs averaging 6 prescriptions per patient aged 50 years or older(6). Pharmaceutical care as delivered by their community pharmacist is critical in the ability of the rural citizen to maintain good health.

Pharmaceutical care will assume greater stature with the increasing shift of patient care to the ambulatory and home care arenas. Health care reform, whether legislated or not, is exacting a change in health care delivery. Tertiary care such as that provided in hospitals is expensive. Home health care and ambulatory care for eligible patients is increasingly elected. With this change, the ambulatory care pharmacist will be expected to deliver more information and assist in managing the patient's drug therapy. Pharmacists must align themselves to assume a larger role in health care delivery.

Colleges of pharmacy need to explore methods to expand their experiential component, to include more ambulatory care settings and to enhance the mentoring of pharmaceutical care delivery in community settings. The Nebraska Drug Information Network provides a model. Rural community pharmacy practices of the Network afford an excellent opportunity for students to learn in an applied setting how to deliver pharmaceutical care. The students can observe first hand how these rural pharmacy preceptors serve their communities as primary health care providers. Being personally integrated into the communities, the pharmacist has the opportunity to observe outcomes of their interventions. Pharmacy students through their preceptors can learn and understand how to perform the interventions and observe and record associated outcomes. Tools provided by the Nebraska Drug Information Network help position pharmacists as purveyors of pharmaceutical care for patients and their fellow health care colleagues and mentor students in that role. While financing may preclude replication of a project of this magnitude, the reader may elect to pilot a similar project at a single educational site and expand as budgeting allows. Our project is detailed herein to facilitate that process.

INCEPTION OF THE NEBRASKA DRUG INFORMATION NETWORK

The concept for the Network was developed through discussions with representatives of the University of Nebraska Medical Center (UNMC), the Governor's office and United States Senator Robert Kerrey's staff, who were instrumental in identifying funding sources for this project. Reasons for implementing the Network were threefold: (*i*) to advance the implementation of pharmaceutical care in rural areas; (*ii*) to prepare pharmacy students for expanded roles in the community pharmacies; and (*iii*) to establish a pharmacy model in rural areas demonstrating that distance need not impair the pharmacist's access to health information, hence making such a practice site more appealing to a pharmacy student.

A special appropriation through the U.S. Department of Housing and Urban Development (HUD) was made to the State Department of Economic Development in 1992, and subcontracted to the College of Pharmacy for implementation. Currently, the administration of the Network project is conducted at the UNMC. Six, 12 and 12 sites were implemented during the first, second and third year 1993, 1994 and 1995, respectively. The final site was implemented in November 1995.

UNMC's Synapse™ telecommunication system is an integral part of the Network. Synapse™ system provides online telecommunications capabilities enabling Network pharmacies access database systems at UNMC, including library and patient care resources. Synapse™ also provided funding for the technical personnel required for installation of computer hardware and software. Synpase™ is offered to the Network pharmacies with toll-free access. Hence, electronic communication between the pharmacies and to the College of Pharmacy is made available.

DESCRIPTION OF THE NETWORK

Thirty rural community pharmacy sites were selected by the UNMC for the Nebraska Drug Information Network (see Figure 1). Sites were selected based on their interest in providing pharmaceutical care, previous or potential high quality preceptor activity, and patient education activities. Isolated rural communities, especially if there were no other health care practitioners in the immediate area, were given

stronger consideration. No sites were implemented in the Omaha or Lincoln metropolitan areas. All participants must have had a history of legal and ethical practice of their profession in good standing with a pharmacy permit. Pharmacists had to indicate a willingness to participate in ongoing study of pharmacist interventions. It was also looked upon favorably if the community had previously expressed an interest in UNMC's rural health education activities. The pharmacy design had to be of a nature that could accommodate patient education activity. Space requirements for the computer itself were modest approximating three square feet. Two pharmacies underwent renovation at their expense to develop a private area for patient consultation. Pharmacists who engaged in community and professional activities were also viewed more favorably especially in light of the mentoring role they would be providing for our pharmacy students. Sensitivity was displayed to those communities where two or more independent pharmacies with a good track record of preceptorship exist assuming all other criteria had been met. Pharmacies were not required to expend any monies for this project outside of a telephone line toggle switch to accommodate telecommunication functions if needed. As mentioned earlier, renovation expenses were absorbed by two pharmacies but this was not demanded as a condition of selection.

Each site was provided a windows-based, 486, IBM-compatible desktop multimedia computer. Equipped with CD-Rom technology and other multimedia features, the Network pharmacist is positioned to deliver technology-based drug and health information. The videos and graphics afforded by the multimedia technology meet the interest and needs of our visually-oriented society. The computers each cost approximately $2,500 with an additional $1,000 for software. While all pharmacies already had existing computers, this system was implemented as a stand-alone system such that patient access would then not interfere with other pharmacy operations. Additionally, the Network computer is positioned near the pharmacy but not in the dispensing area, hence confidential pharmacy matters would not be infringed upon. System software updates will be dictated by budget considerations. Eventually, once budget monies are exhausted, the pharmacies will assume update costs. Hence, this system provides pharmacies with consumer-oriented education and access to drug information support for specific information needs with minimal or no initial financial outlay by the pharmacy.

More than 20 health-oriented software programs were reviewed for possible inclusion at the Network sites. Software products were selected based on the breadth (*e.g.,* medical procedures, definitions, anatomy, video), detail (*i.e.,* was sufficient detail of a procedure provided to be useful) and accuracy of information they offered. No program was identified as providing inaccurate information but some were not current in new drugs or drug-drug interactions. A grid was completed when each program was evaluated noting if the certain areas were addressed: health maintenance information, drug interactions, drug product identification, printing capabilities, multilingual, etc.. Graphic, video and audio capabilities were also considered. Because the passage of Omnibus Budget Reconciliation Act of 1990 (OBRA 90) resulted in all the pharmacies already possessing patient-oriented textual drug information, our focus was on delivery of health and drug information
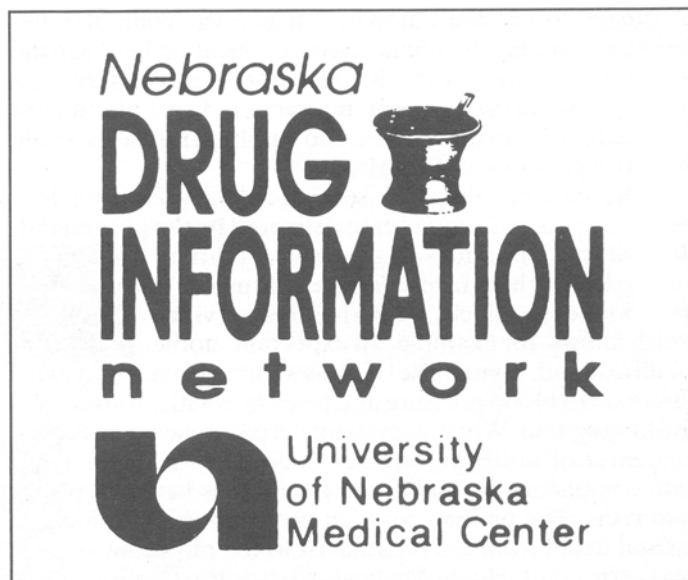

Fig. 2. Nebraska Drug Information Network logo.

(*e.g.,* tablet identification features) not provided in programs already available at the sites. Cost was also a consideration. The following programs were selected (see Appendix for a complete listing with addresses): Bodyworks™, DynaPulse™, Home Medical Advisor Pro™, Mayo Clinic Family Health Book™, Mayo Clinic The Family Pharmacist™, Wellness Checkpoint™, and Womb with a View™. Home Medical Advisor Pro™ , Mayo Clinic Family Health Book™ and Mayo Clinic The Family Pharmacist™ were obtained in CD-Rom format. The aforementioned products all provide information in patient-oriented language. All products are marketed directly to the patient, hence the pharmacy is not delivering information that would be considered suitable only for health care professionals. Technical information is also available to the pharmacist through the Synapse™ telecommunications database. Thus the pharmacist can access Medline™ or other online databases to conduct a computer search on a specific drug topic. The hardware and software provided to the pharmacist by the Nebraska Drug Information Network allows the pharmacist to access the most technical databases as well as patient education databases, all of which enhance the pharmacist's ability to deliver quality pharmaceutical care.

The information available to the pharmacist is of value only if it is used. Each site is provided with a window sticker for front door placement designating the pharmacy as a site of the Nebraska Drug Information Network (see Figure 2). When a site was implemented, the local media organizations (newspaper, radio stations) were notified and provided with news releases. Brochures describing the Network were sent randomly to citizens in the geographic areas served by the Network site. All of these activities are designed to increase community awareness of the pharmaceutical care features of the Network pharmacy.

APPLICATION OF COMPUTER TECHNOLOGY

The databases provided by the Network have positioned the pharmacies as the premier health information source in their community for patients as well as for other health care providers. In some communities, physicians have visited the

pharmacy to use the databases, hence the computer has served as a venue for enhanced communication between the physician and the pharmacist. The databases also serve as a conduit for further patient interaction (*e.g.,* pharmacist explanation of hypertension and antihypertensives while demonstrating use of DynaPulse™).

The patient education software databases provide a venue for pharmaceutical care delivered by the pharmacist. Bodyworks™ provides an anatomical journey through the human body which facilitates the pharmacist's explanation of various drug effects. It also has limited video capabilities which allows, for example, an expectant mother to observe an ultrasound. Dynapulse™ allows for computerized measurement of blood pressure and heart rate with an attendant tracking system. With this system, the pharmacist can record outcomes of antihypertensive medication in conjunction with compliance and adverse effect issues between physician visits. The patient can then provided this graphic and textual detail from the pharmacist to the physician at their next office visit. Home Medical Advisor Pro™ allows for a review of diseases and symptoms in lay language. Its library of over 100 videos allows the patient to capture a glimpse of what can be expected of a recommended procedure. This is of special value in a rural community where many patients must be referred to another center for procedures and surgeries. Viewing a video prior to the trip to the tertiary care center can allay considerable anxiety and perhaps promote the patient's compliance with the recommended course. Wellness Checkpoint™ assumes a role of promoting health awareness and maintenance and allows the patient to assess their own health status through a series of questions. These questions address diet, exercise, family health history and stress management, among other topics. The program provides suggestions on how the patient can improve their health status by adopting simple preventive measures. Womb With a View™ provides a descriptive and pictorial progression of pregnancy which the pharmacist can use to describe potential drug effects at various stages of gestation. Some pharmacies have placed a notice in the over-the-counter home pregnancy test section alerting the pregnant patient to the availability of this program. The computer is located near the dispensing area but is fully accessible to the patients. Patient can use these software programs initially with the assistance of the pharmacist but on subsequent visits, can access the data independently. Pharmacists, however, are always available to answer questions and put the information into perspective for that particular patient's condition. Each computer is equipped with a tracking system that will allow evaluation of which programs were accessed specifying the associated time period.

Providing computer resources does not necessarily translate into improvement in delivery of pharmaceutical care. However, in the pharmaceutical care training seminar the preceptors are instructed on how to use the computer and an upgrade of their clinical skills to advance their delivery of pharmaceutical skills is provided[1]. Targeted disease areas include hypertension, diabetes, and asthma. Management issues of implementing pharmaceutical care is also addressed. The extent to which this educational intervention is effective in promoting pharmaceutical care is the focus of another ongoing study[2]. In this study, pharmaceutical care activities both before and after the seminar will be evaluated.

DOCUMENTATION

The future of pharmacy rests with recognition of the value of cognitive service and reimbursement but remuneration will not be obtained until the profession consistently and accurately documents pharmaceutical care activities. In documentation studies, evidence of cost savings was obtained, hence acknowledging the economic value of pharmaceutical care(7). Extrapolated cost avoidance secondary to a 82.5 percent acceptance rate of pharmacist recommendations was $19,076 in a study of 297 pharmacist interventions in an ambulatory care clinic(9). These findings concur with another study of 278 interventions where an 89 percent acceptance rate was associated with a decrease in drugs costs by $1,662 and decreased patient charges of $5,938(11). In another study, savings were estimated at $1.49 per inpatient day(10). Clearly, pharmacist interventions have a positive impact on patient care. The magnitude of this effect, however, has not yet been fully recognized in a community pharmacy setting due to lack of documentation.

A database software program was developed for use by the pharmacists of the Nebraska Drug Information Network. Embedded with the Paradox™ program (Borland Industries, Inc.), this form categorizes data according to pharmacist, patient and pharmacy student demographic information, medications, adverse reactions and intervention information. Medication information includes drug, drug dosage, lot number, indications for use, etc. Adverse drug reaction information collects data on the nature of the adverse effect and how it was managed. Pharmacist interventions are categorized according to whether the intervention relates to a prescription or nonprescription product. Outcomes, when known are included. Patient names are not entered in order to maintain patient confidentiality. The data from all 30 sites will be reviewed in aggregate hence it is not possible to identify a patient by age, gender, etc. Pharmacists receive computer training from the computer analyst during installation and in consultation with the Director. The Director also provides computer instruction in a pharmaceutical care training seminar required of each participant as previously described. The documentation will periodically be reviewed and evaluated by the Director using remote data transfer technology. In this manner, trends in adverse drug reactions, interventions and other drug issues will be discerned. If appropriate, the Director will issue a communication alerting the other Network pharmacists to the ongoing phenomenon (*e.g.,* an ADR occurs disproportionately with a new NS AID). The primary intent of this data collection is to document the time, costs and nature of pharmacist interventions and to collect pharmacoepidemiologic data regarding drug use in rural communities. It is anticipated that the latter will be of value to funding entities interested in pharmacoepidemiologic data.

EDUCATION

Each Network site serves as a preceptor for our pharmacy students. The goal for each senior student selecting this elective is to provide applied experience in providing pharmaceutical care. An additional educational outcome for the student is to acquire functional knowledge on computer hardware and software considerations should they want to implement a similar program in their pharmacy post-graduation. Each student completes a two-day computer laboratory

experience prior to beginning their rotation at the Network site (the computer laboratory experience is the focus of a separate study currently underway). The student reviews the software available at the site as well as an additional 15 programs commercially available. Each student then prepares a report detailing which programs they would select for their pharmacy. The student receives laboratory instruction in computerized monitoring of blood pressure and blood sugar, documentation issues and programs and use of other professional databases. The students then complete their month clerkship at the Network site. The students observe the preceptors utilizing computerized resources to help deliver pharmaceutical care. The students gain experience in documenting their interventions and observed outcomes on the provided software. Data is presently being obtained on the nature of the interventions and on usage of each software program. These data will be made available to the pharmacy students to assist in their evaluations of the software and practice mode. Our intent is for the students to consider these Network sites the model of future pharmacy practice incorporating pharmaceutical care principles. To date, 22 students have completed this Network rotation.

THE FUTURE

Robotics, automation and mail order pharmacies will assume a much larger role in the near future in dispensing drug products. Consequently, there will be a need for fewer pharmacists in dispensing roles. The profession's future viability lies in positioning the profession to provide drug and health information in accessible fashion to the public and other health care providers. Pharmaceutical care meeting informational needs will serve as the distinguishing feature between those remaining pharmacies of the future. In this descriptive report, we outline a model whose focus is to deliver pharmaceutical care with a diminished focus on product delivery. These sites serve as models for our senior students during the experiential component of their curriculum. The pharmacists of the Nebraska Drug Information Network are equipped with the computerized armamentarium to support pharmaceutical care that will help secure their position on the health care team of the future. Future research on this model will determine the extent to which this support assisted in delivering pharmaceutical care and in precepting pharmacy students.

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APPENDIX. COMPUTER SOFTWARE PROGRAMS FOR PATIENT EDUCATION USED BYTHE NEBRASKA DRUG INFORMATION NETWORK

DynaPulse; Unlimited Windows Version
Pulse Metric, Inc.
10225 Barnes Canyon Rd, Ste A100
San Diego, CA 92121
phone: 619-546-9461
fax: 619-546-9470
$499

Mayo Clinic Family Health Book
IVI Publishing
1380 Corporate Center Curve, Eagan, MN 55121
phone: 612-686-6895
fax: 612-686-2601
$69.95

Home Medical Advisor Pro (CD)
Pixel Perfect, Inc.
10460 S. Tropical Trail
Merritt Island, Florida 32952
phone: 407-777-5353
fax: 407-777-0323
$99.95

BodyWorks 3.0
PC Connection
6 Mill Street, Marlow, New Hampshire 03456
phone: 800-243-8088
fax: 603-446-7791
$69.95

Wellness Checkpoint InfoTech
Inc. 485 Madison St. Winnipeg,
Manitoba Canada, R3J1J2 204-885-2558 (fax: 831-0416)
$99

Mayo Clinic Family Pharmacist
IVI Publishing
1380 Corporate Center Curve, Eagan, MN 55121
phone: 612-686-6895
fax:612-686-2601
$89.95

Womb With A View
International Micro Design, Inc.
8705 Elk Grove Blvd.
Elk Grove, CA 95624
phone: 916-686-8152
fax: 916-685-1699
$49.95