Pharmaceutical services in rural hospitals in Illinois—2001

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Abstract: The results of a survey characterizing pharmaceutical services in rural hospitals in Illinois are reported and compared with results of a similar survey conducted in 1991.

A questionnaire was developed and mailed to pharmacy directors at rural hospitals in Illinois to obtain information about product-related services, the use of technology, clinical pharmacy services, and human resources data (including vacancies) for 2001.

Of the 71 surveys that were mailed, 47 pharmacy directors (66%) responded. Respondent hospitals were smaller compared with those responding in 1991 (mean average daily census, 41.0 versus 51.2, respectively). As in 1991, nearly all respondents reported the provision of unit dose services and complete and comprehensive i.v. admixture programs (100% and 83%, respectively, for 2001). Three respondents (6%) reported having a cleanroom facility. The most commonly used technology reported was nursing-unit-based automated drug dispensing cabinets (35%). Nearly all hospitals reported providing drug therapy monitoring, patient education and counseling, pharmacokinetic consultations, and nutritional support. Consistent with national reports, staffing levels and vacancies increased between 1991 and 2001. In 2001, the mean number of full-time equivalents was 7.1, with a pharmacist to technician ratio of 1.0:1.08 and a ratio of pharmacists to occupied beds of 1.0:22.6. The overall vacancy rate was 8%, with a vacancy rate of 14% and 5% for pharmacists and pharmacy technicians, respectively.

A 2001 survey of pharmacy departments in rural hospitals in Illinois showed progression in the provision of distributive and clinical pharmacy services since 1991. Employee vacancy rates in pharmacy departments were high in 2001, especially among pharmacist positions, but were lower than those reported for the general population of hospitals.

Index terms: Administrators; Data collection; Hospitals; Illinois; Patient information; Personnel, pharmacy; Pharmaceutical services; Pharmacy, institutional, hospital; Technology

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Small, rural hospitals in the United States encounter enormous economic pressures from, among other things, shrinking reimbursement for services in the face of rising costs of technology and personnel. Unlike hospitals in metropolitan areas, rural hospitals often have a limited population from which to draw patients. Moreover, patients living in rural communities often seek larger metropolitan hospitals for care because of perceptions of better or more advanced services. Recruiting and retaining qualified personnel may be more difficult in the rural environment because of the limited pool of applicants as well as the absence of economies of scale that exist in larger urban hospitals that support advanced technology or specialist personnel.

These pressures can affect all aspects of hospital operations, including the provision of pharmacy services. Further, insufficient funding jeopardizes adequate pharmacy staffing, clinical program development, and personnel advancement. Therefore, it is important to measure pharmacy practice in this setting so that efforts can be made to ensure appropriate allocation of resources and to highlight problems and solutions.

The status of rural hospital pharmacy practice in the United States has not been well characterized. Large national surveys of hospital pharmaceutical services, such as that conducted by the American Society of Health-System Pharmacists (ASHP), typically include only a

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small percentage of rural hospitals, and the data in these surveys are often not expressed in a manner that allows for characterization of rural hospitals.[1] Further, while national surveys may help in our understanding of pharmacy practice in rural hospitals on a national level, the results may not accurately reflect such practice within single states or regions (because of even more limited respondents within a single state). Thus, such survey findings may not be useful in making policy decisions on a state or regional basis.

In 1991, a seminal survey of pharmaceutical services in rural hospitals was conducted in the state of Illinois.[2] Data from that survey demonstrated that rural Illinois hospitals were comparable with other U.S. hospitals in the provision of most pharmaceutical services. However, vacancy rates for pharmacist positions were considerably higher than those reported nationally. Since the time of that survey, there has been a pronounced national shortage of pharmacists.[3] A study released by the American Hospital Association (AHA) in June 2001 found that pharmacists have the highest vacancy rate (21%) among hospital positions.[4] Further, the pharmacist vacancy rate in rural hospitals was 29%, compared with 15% in urban hospitals. That shortage appears to have been first recognized in the 1991 survey of rural Illinois hospitals, and over the past 10 years it has been documented nationally across all sectors of pharmacy practice. As such, it could be argued that the initial survey of rural Illinois hospitals served as a bellwether for pharmacy practice, at least with respect to the pharmacist job market.

A decade has passed since that 1991 survey was conducted. Aside from the current national shortage of pharmacists, many changes have occurred in the practice of hospital pharmacy. Hospitals have merged horizontally with other hospitals and have integrated vertically to form health systems, often with corporate-level pharmacy services.[5] The dictum of pharmaceutical care, first described in 1990, has now been fully embraced by the profession of pharmacy; in some cases this has directly affected the structure and approach to patient care.[6] Evidence has continued to mount supporting the economic value of clinical pharmacy services, resulting in further expansion of that aspect of practice.[7] Adoption of technology and automation in hospital pharmacy practice has accelerated, and reports about telemedicine and telepharmacy suggest the advantages of such services for rural providers.[8,9]

What is unknown is the degree to which these national issues have been realized in rural hospitals in Illinois. It is also unknown whether the national shortage of pharmacists continues to affect rural hospitals in Illinois. The purpose of this study was to characterize pharmacy practice in rural hospitals in Illinois and compare specific aspects with national findings and historical data from Illinois. This study had three specific objectives: (1) identify and quantify the provision of pharmacy services in rural hospitals in Illinois, especially with respect to trends occurring nationally, (2) measure the degree and impact of the national shortage of pharmacists on the provision of pharmacy services in rural hospitals in Illinois, and (3) compare the current status of such services to findings from a similar study conducted in 1991.[2]

Methods

We conducted a mail survey of pharmacy directors at hospitals in rural Illinois in fall 2001. A questionnaire was designed to identify and quantify the provision of pharmacy services in these hospitals. The questionnaire was modeled after the instrument used in the 1991 survey; however, certain questions were revised and others were added to make it more relevant to contemporary practice.[2] Questions were included to measure the following hospital characteristics: (1) hospital size and scope, (2) inpatient drug distribution systems and services, including use of automation, (3) clinical pharmacy services, and (4) human resources and staffing. A draft questionnaire was reviewed and completed by eight individuals with experience in rural hospital practice or survey research methods. Revisions were then made based on results and feedback from the pilot survey. The final 23-item questionnaire was then developed.

All rural hospitals in Illinois with a division 3 pharmacy were included in the study. In the state of Illinois, a division 3 pharmacy is a pharmacy located in a hospital with or without a nursing home.[10] Rural hospitals were differentiated from urban hospitals on the basis of geographic location within a county outside of a designated metropolitan statistical area (MSA).[11] Specifically, names and addresses (including county) for all division 3 licensees in the state were obtained from the Illinois Department of Professional Regulation, and the counties of division 3 licensees were compared to those listed by the U.S. Census Bureau for each MSA within Illinois. Of the 251 division 3 licensees, 85 were located in counties outside of an MSA and were defined as rural. Nine of the 85 licensees were deleted from the study population because they were not considered acute care facilities (7 were correctional centers, developmental centers, or mental health facilities; 1 was a Veterans Affairs health facility; and 1 was primarily an outpatient care center). In addition, 4 of the 85 were duplicate licensees from the same facilities, and 1 licensee was a hospital that had previously shut down. The final survey population numbered 71. The eligibility of each hospital was confirmed with the *AHA Guide to the Health Care Field 2001–2002*.[12]

Questionnaires were mailed to the director of pharmacy at each of the

71 facilities. These facilities were distributed across 55 counties in the state. A cover letter and self-addressed stamped envelope were included in each survey packet. Efforts taken to maximize the response rate included duplicate mailings of the questionnaire with a revised cover letter to nonresponders at 4, 8, and 12 weeks after the initial mailing and reminder telephone calls to nonresponders at 16 weeks after the initial mailing, with a final mailing to those indicating willingness to complete the questionnaire. In addition, an announcement encouraging members to respond to the survey was printed in *KeePosted*, the official journal of the Illinois Council of Health-System Pharmacists (ICHP).[13] The announcement stated that the survey was endorsed by ICHP.

Data obtained from usable responses were coded, entered, and saved using commercially available database management software (Microsoft Access and Excel, Microsoft Corp., Redmond, WA). In addition, data for both respondents and nonrespondents were obtained from the *AHA Guide* to assess nonresponse bias and to validate certain items in the self-reported responses.[12] Statistical software was used to generate descriptive statistics, and summary statistics were primarily used to characterize the population (SPSS for Windows, release 11.0.1, SPSS Inc., Chicago, IL). Inferential statistics were used (separate variance *t* tests for independent groups) for selected comparisons among hospital characteristics, with an a priori alpha level of 0.05. All results were expressed in terms of usable responses for each question or criterion. When appropriate, results were compared with data from the 1991 survey.[2]

Results

A total of 47 completed questionnaires were received, yielding a response rate of 66%. This response rate was lower than that of the 1991 survey, in which 77 (81%) of 95 mailed surveys were completed. In addition, the survey population markedly declined from 1991 to 2001 (95 versus 71 hospitals, respectively), representing a 25% reduction in the number of rural hospitals in Illinois over the 10-year period.

Hospital size, ownership, and integration. Table 1 shows mean values for hospital size and level of activity as reported by respondents. A majority of rural hospitals in Illinois are small and have gotten smaller in the past 10 years. Moreover, for all of the reported values, larger hospitals in the sample are likely to have skewed the data upward. This is demonstrated by the 2001 median values for the number of licensed beds (85), operational beds (55), average daily census (24), admissions (2,362), and outpatient visits (35,382).

Table 2 provides information on tax status, ownership status, and integration of respondent hospitals. Based on tax status, the majority of respondents (determined from the number of usable responses) reported to be not-for-profit (43/47, 91%), but the percentage that reported being for-profit increased slightly from 1991. With respect to ownership, the largest percentage of respondents reported being self owned (34%). The percentage of self-owned facilities increased during the past 10 years as did the percentage reporting to be investor owned, while other categories (church or religious, county owned, city owned, or state owned) decreased.

Hospital integration was classified as horizontal (ownership of or by other hospitals) and vertical (ownership of other health care facilities, such as physician offices). A majority, 62%, of the hospitals were independent (a single hospital). The percentage reporting being part of a multihospital system increased from 31% in 1991 to 38% in 2001. Data on ownership or management of physician offices or clinics, home health care agencies, nursing homes, and other vertically integrated health care services or facilities are also shown in Table 2.

Pharmacy expenditures. Table 3 displays reported pharmacy expenditures for 2001 survey respondents in the past fiscal year. Total pharmacy expenditures increased in real terms by nearly 60% from 1991 to 2001 ($1,075,022 versus $1,626,233, respectively, in 2001 dollars). As expected, pharmaceuticals accounted for the majority of pharmacy expenditures (74%). When adjusted for inpatient volume, rural hospitals spent approximately $322 per patient admission or $63 per patient day in 2001.

Product-related pharmacy services. Respondents were asked about the hours of operation of the hospital pharmacy. The mean number ± S.D. hours of operation of the pharmacies was 66.5 ± 29.6 hours per week, which is comparable to that reported in 1991 (68.6 hours per week). Respondents were also asked how drugs were made available during the times when the pharmacy is closed. Responses included on-call pharmacists available (39/46, 85%), access to the

Table 1.
Hospital Volume and Activity

Characteristic	Mean ± S.D. Value (No. Usable Responses)[a]	
	2001	1991[2]
No. admissions	3,720.3 ± 3,669.2 (30)	NR[b]
Average daily census	41.0 ± 41.3 (40)	51.2 ± 44.3 (77)
Average length of stay	4.06 ± 1.2 (40)	4.9 ± 1.1 (77)
No. licensed beds	103.2 ± 79.5 (46)	115.5 ± 81.3 (77)
No. operational beds	76.7 ± 63.3 (39)	93.8 ± 63.9 (77)
No. outpatient visits	48,615.6 ± 57,755.2 (20)	NR

[a]There were 47 total respondents to the 2001 survey and 77 to the 1991 survey.
[b]Not reported.

Table 2.
Hospital Ownership and Integration

Characteristic	No. (%) Usable Responses in Survey Year[a] 2001	1991[2]
Tax status		
No. usable responses	47	71
For-profit	4 (9)	2 (3)
Not-for-profit	43 (91)	69 (97)
Ownership		
No. usable responses	47	71
Self owned	16 (34)	20 (28)
Church or religious	10 (21)	15 (21)
County owned	10 (21)	17 (24)
City owned	6 (13)	12 (17)
Investor owned	4 (9)	2 (3)
Other	1 (2)	3 (4)
Federal owned	0	0
State owned	0	2 (3)
Horizontal integration		
No. usable responses	47	70
Independent hospital	29 (62)	48 (69)
Part of multihospital system	18 (38)	22 (31)
Vertical integration		
No. usable responses	45	NA[b]
Private physician office	33 (73)	
Home health care agency	27 (60)	
Long-term-care facility	20 (44)	
Home hospice or hospice home	17 (38)	
Durables medical supply company	9 (20)	
Subacute care facility	9 (20)	
Residential facility	6 (13)	
Managed care or health insurance	5 (11)	
Retail pharmacy	5 (11)	
Other	3 (7)	
Home respiratory care company	1 (2)	

[a]There were 47 total respondents to the 2001 survey and 77 to the 1991 survey.
[b]Data on vertical integration not collected in 1991 survey.

Table 3.
Pharmacy Department Expenditures in 2001[a]

Expenditure	Mean ± S.D. Expenditure ($)	Median Expenditure ($)
Total expenditures[b]	1,626,233 ± 1,881,396	925,000
Pharmaceuticals[c]	1,196,871 ± 1,482,138	600,000
Pharmacy personnel[d]	315,671 ± 234,913	277,292

[a]Monetary units expressed as 2001 U.S. dollars.
[b]Defined as inclusive of drugs, supplies, personnel, and all other expense catagories; inclusive of all cost centers within the department, if applicable (35 respondents).
[c]Defined as inclusive of pharmaceuticals and intravenous solutions and inclusive of all cost centers within the department if applicable (36 respondents).
[d]Defined as inclusive of all pharmacy personel and inclusive of all cost centers within the department, if applicable (36 respondents).

pharmacy by nursing supervisor(s) (33/46, 72%), floor stock supplies available on nursing unit(s) (29/46, 63%), separate night cabinet(s) (26/46, 57%), and automated medication machines (16/46, 35%).

Table 4 shows the percentage of respondents reporting various drug distribution services. All reported having a unit dose distribution system (up from 96% in 1991). Centralized drug distribution systems alone, supplemented by additional medications in floor stock areas or supplemented by additional medications in nursing-unit-based automated dispensing machines (ADMs), characterized almost all rural hospitals (46/47, 98%). I.V. admixture programs were categorized as "complete" (inclusive of nearly all i.v. admixture products and solutions), "comprehensive" (provided to all areas of the hospitals), or both. A majority of respondents reported that their i.v. admixture program was both complete and comprehensive (39/47, 83%), an increase from 1991 (71%). Respondents were also asked about the physical makeup of the sterile-product-manufacturing area; a majority of respondents reported having one or more laminar-airflow hoods located in a physically separate "i.v. room" (27/46, 59%).

Technology and automation. Respondents were asked about the use of bar code technology for various applications, automation drug preparation (i.e., sterile product compounding), central inpatient pharmacy-based robotic systems, nursing-unit-based ADMs, outpatient pill-counting or bottle-filling systems, outpatient prescription-dispensing systems, and computerized physician order entry. Most respondents reported using none of the automation or technology listed (25/46, 54%). However, over one third reported use of nursing-unit-based ADMs (16/46, 35%).

Respondents were also asked about the use or application of telemedicine or telepharmacy technology in the hospital pharmacy department. Only three hospitals (6%) reported using telepharmacy services. One respondent whose facility did not use such technology indicated that grant money was allotted for videoteleconferencing, which may be purchased in the future.

Clinical pharmacy services. Respondents were asked about the method by which clinical pharmacy services were provided in the hospi-

Table 4.
Provision of Drug Distribution Services

Service	No. (%) Usable Responses in Survey Year[a] 2001	1991[2]
Unit dose distribution system[b]		
Yes	47 (100)	(96)
No	0	(4)
I.V. admixture program[c]		
Complete, comprehensive	39 (83)	(71)
None	5 (11)	(10)
Incomplete, comprehensive	3 (6)	(14)
Complete, noncomprehensive	0	(3)
Incomplete, noncomprehensive	0	(3)
Sterile product manufacturing facility[d]		NA[f]
Laminar-airflow hood in separate i.v. room[e]	27 (59)	
Laminar-airflow hood within main pharmacy work area	15 (33)	
Laminar-airflow hood in a separate cleanroom[g]	3 (7)	
Other	1 (2)	
Patients provided with outpatient prescriptions		
Hospital employees	24 (51)	(65)
None	18 (39)	0
Patients discharged from emergency room	7 (15)	(69)
Inpatients being discharged	7 (15)	(26)
General public	6 (13)	(4)
Clinic patients	5 (11)	(36)
Other	1 (2)	0

[a]Unless otherwise noted, $n = 47$ for the 2001 survey and 77 for the 1991 survey. Response frequencies from 1991 survey unavailable.
[b]A unit dose system was defined as a system in which (1) most medications are dispensed in a single-unit or unit dose package, (2) medications are dispensed in a ready-to-administer form, (3) not more than a 24-hour supply of medication is dispensed, and (4) a medication profile is kept for each patient.
[c]Complete and comprehensive = pharmacy preparation of nearly all i.v. admixture products and solutions for almost all patient care areas, incomplete and comprehensive = pharmacy preparation of only certain i.v. admixture products and solutions for almost all patient care areas, complete and noncomprehensive = pharmacy preparation of nearly all i.v. admixture products and solutions but only for some patient care areas, and incomplete and noncomprehensive = pharmacy preparation of only certain i.v. admixture products and solutions for only some patient care areas.
[d]$n = 46$ for the 2001 survey.
[e]I.V. room = room that is physically separate from the main pharmacy work area.
[f]Not assessed.
[g]Cleanroom = specially constructed facility with ≤10,000 particles per cubic foot of air.

tal. Most respondents reported that clinical pharmacy services were provided by pharmacists working primarily in the central pharmacy who periodically visit the patient care areas (27, 58%). Three respondents (6%) reported having pharmacists based in patient care areas, one (2%) reported pharmacists in satellites, and nine (19%) had pharmacists in both areas. Seven respondents (15%) reported having no clinical pharmacy services.

Respondents were asked about the provision and frequency of provision of certain clinical pharmacy services. Table 5 compares the percentage of hospitals reporting the provision of selected clinical pharmacy services in 2001 and 1991. The percentage of hospitals providing patient-specific clinical pharmacy services increased markedly between 1991 and 2001. In fact, large percentage increases are seen for each type of patient-specific clinical pharmacy service listed.

Human resources. Table 6 shows the budgeted and actual levels of pharmacy staffing by position in the 2001 survey. The mean ± S.D. total number of budgeted full-time equivalents (FTEs) was 7.13 ± 5.59, while actual FTEs totaled 6.56 ± 6.81. Based on the values for actual and budgeted FTEs, we calculated the vacancy rate overall and for each position. The overall vacancy rate was 8%. The following vacancy rates were noted per position: pharmacy director (11%), associate or assistant director (71%), staff pharmacist (13%), and pharmacy technician (5%). The combined vacancy rate for pharmacist positions was 14%, and the combined pharmacy support staff vacancy rate was 3%. The vacancy rates for pharmacists and support staff were higher than the rates reported in 1991 (10% and 1%, respectively). The ratio of pharmacist FTEs to support staff FTEs was about even at 1.0:1.08. This ratio reflects a higher rate of use of supportive personnel than that reported in 1991 (1.0:1.3). The ratio of pharmacist FTEs to operational beds was 1.0:22.6. This ratio is also higher than that reported in 1991 (1.0:33.5).

Respondents were further queried about the labor situation. When asked if they felt the rate of vacancies for pharmacists had increased, decreased, or stayed the same compared with the previous year, 70% responded that it had stayed the same, while 20% reported that it had increased. Similarly, 88% reported that the rate of vacancies for pharmacy technicians had stayed the same. Respondents were asked about the reasons for these vacant positions. Geographic location (making it difficult to recruit) and inadequate salary were the two most common responses ($n = 14$ [of 31] 45% each). Respondents were also asked to identify the reasons given for resignations in the past year (Table 7). The most common responses were that ex-employees had found new jobs with better pay (15/32, 47%) or left for personal or family reasons (12/32, 38%). Table 7 also shows actions taken to recruit or retain pharmacists. The most common

Table 5.
Provision of Clinical Pharmacy Services

Service	No. (%) Usable Responses[a] 2001	1991[2]
Patient specific		
Drug therapy monitoring[b]	46 (98)	(73)
Patient education and counseling[c]	44 (94)	(24)
Pharmacokinetic consultation[d]	42 (89)	(32)
Nutritional support[e]	39 (83)	(38)
Written drug history[f]	22 (48)	(0)
Other	3 (6)	…
Other		
Adverse drug reaction monitoring or reporting	46 (98)	(97)
Drug information	43 (91)	(51)
Drug-use evaluation	43 (91)	(97)
Medication error monitoring or reporting	42 (89)	(95)
Inservice education programs	42 (89)	(88)
Drug research	19 (40)	(12)
Medical emergency response	16 (34)	(31)
Poison information	11 (23)	(24)
Other	2 (4)	(0)

[a] $n = 47$ for the 2001 survey and 77 for the 1991 survey. Response frequencies from 1991 survey unavailable.
[b] Drug therapy monitoring = concurrent monitoring of drug therapy, including identification of information beyond that contained on the drug order and oral or written follow-up if needed.
[c] Patient education and counseling = provision of information beyond that of simply reviewing the directions on a medication label.
[d] Pharmacokinetic consultation = review of serum drug concentrations and medical records, with oral or written recommendations and follow-up as needed.
[e] Nutritional support = participation on a total parenteral nutrition team, review of medical records, and provision of written or oral follow-up as needed.
[f] Written drug history = documented prescription and over-the-counter drug use and problems associated with information obtained by oral interview with the patient.

Table 6.
Pharmacy Department Staffing in 2001 Survey

Position	Mean ± S.D. No. FTEs[a] Budgeted	Actual
Director	0.97 ± 0.12	0.86 ± 0.32
Associate or assistant director	0.21 ± 1.04	0.06 ± 0.25
Supervisor or manager	0.09 ± 0.28	0.09 ± 0.28
Clinical coordinator	0.04 ± 0.20	0.04 ± 0.20
Clinical pharmacist	0.44 ± 0.81	0.44 ± 0.81
Staff pharmacist	1.65 ± 2.17	1.44 ± 2.05
Pharmacy buyer	0.23 ± 0.67	0.30 ± 0.78
Pharmacy technician	3.37 ± 3.80	3.20 ± 3.90
Secretary	0.08 ± 0.25	0.08 ± 0.25
Other	0.04 ± 0.20	0.04 ± 0.20
Total	7.13 ± 5.59	6.56 ± 6.81

[a] FTE = full-time equivalent, defined as working 40 hours per week ($n = 47$).

action was increasing staff salaries (16/37, 43%).

Respondents were asked their opinions about the effect of vacancies on the provision and outcomes of pharmacy services (Table 8). A majority of respondents reported decreased satisfaction on the part of pharmacy staff (15/29, 52%). Decreased satisfaction with pharmacy services on the part of nursing and medical staff was also common (10/29, 34%). Many respondents also reported an increase in pharmacy-related medication errors as a result of vacancies (9/29, 31%).

Respondents were asked about changes in the operations of the pharmacy department that were necessitated by or occurred in response to vacancies. The most common response was a reduction in the amount of time available to provide clinical pharmacy services (20/35, 57%), followed by the expanded role and use of pharmacy technicians (17/35, 49%). Expanded use of overtime pay and expanded use of part-time staff were also commonly cited.

A series of questions addressed labor issues related to pharmacy technicians. Respondents were asked if the role of pharmacy technicians at their hospital had expanded in the past five years; most responded that the role of pharmacy technicians had expanded (39/47, 83%). The expanded role was characterized as increased responsibility in drug manufacturing and dispensing (38/40, 95%) and the addition of clinical duties (4/40, 10%). Respondents were also asked about requirements for certification of pharmacy technicians. A majority of respondents indicated that pharmacy technician certification was not required for employment but was encouraged (31/46, 67%), and a small percentage indicated that certification was required for all pharmacy technicians (4/46, 9%) or some of the pharmacy technician positions (3/46, 7%). A majority of respondents reported that certified pharmacy technicians received a higher rate of pay (31/40, 78%) than noncertified technicians and that the cost of the examination was paid by the hospital (21/40, 53%). Some respondents also reported that their hospital paid for the continuing education required to maintain certification (8/40, 20%).

Discussion

The results of this survey provide a current characterization of rural hospital pharmacy practice in Illinois and details about changes that have occurred during the 10-year period between 1991 and 2001. Rural hospitals in Illinois are small and have gotten smaller over the past decade. The

Table 7.
Reasons for Pharmacy Department Vacancies and Actions to Recruit or Retain Staff in 2001 Survey

Variable	No. (%) Respondents
Reasons for resignations in the past year (n = 32)	
New job with better pay	15 (47)
Personal or family reasons	12 (38)
New job with better benefits	6 (19)
New job with better opportunities for professional development	5 (16)
Retirement	4 (13)
Job dissatisfaction	4 (13)
Involuntary departure	2 (6)
New job with better hours	2 (6)
Other	6 (19)
Actions taken in past year to recruit or retain pharmacists (n = 37)	
Increased salaries	16 (43)
Made no changes	15 (41)
Increased advertising	9 (24)
Paid sign-on bonus to new pharmacists	8 (22)
Paid retention bonus to existing pharmacists	3 (8)
Improved work environment	3 (8)
Improved benefits	1 (3)
Other	4 (11)

Table 8.
Effects of Vacancies on Pharmacy Operations in the 2001 Survey

Effects	No. (%) Respondents
Effects of vacancies (n = 29)	
Decreased job satisfaction of pharmacy staff	15 (52)
Decreased nurse or physician satisfaction with pharmacy services	10 (34)
Increased pharmacy-related medication errors	9 (31)
Decreased patient satisfaction with pharmacy services	1 (3)
Other	9 (31)
Changes necessitated (n = 35)	
Reduced time spent providing clinical pharmacy services	20 (57)
Expanded role and use of pharmacy technicians	17 (49)
Expanded use of overtime pay	13 (37)
Made no changes	12 (34)
Expanded use of part-time staff	9 (26)
Reduced time spent providing drug distribution services	8 (23)
Expanded use of automation	5 (14)
Reduced hours of operation	3 (9)
Other	4 (11)

median average daily census of these hospitals in 2001 was just 24 patients. Despite this trend, pharmacy departments in these hospitals have advanced over the past 10 years in the breadth and depth of many services provided. There is a need for more published information about pharmacy services in rural hospitals, especially in comparison with their urban counterparts. We encourage ASHP and others to provide further research on the provision of pharmacy services in rural institutional settings.

The percentage of rural hospitals in Illinois providing product-related pharmacy services that meet generally accepted standards for such (complete unit dose system and complete and comprehensive i.v. admixture service) has also increased over the past 10 years.[14,15] Yet the facilities available to pharmacy departments in these hospitals are not always contemporary. One third of respondents reported manufacturing sterile products in a laminar-airflow hood located in the main work area of the pharmacy rather than in a separate i.v. room or cleanroom. These facilities likely do not meet ASHP's definition of a limited-access area.[15]

Among the most significant changes during the past 10 years is the increased provision of clinical pharmacy services. Certain types of patient-specific clinical pharmacy services (drug therapy monitoring, patient education and monitoring, pharmacokinetic consultations, and nutritional support) were reported by nearly every responding hospital. These services were provided in roughly 30% of hospitals in 1991 (except drug therapy monitoring, provided by 73% of hospitals in 1991). Written drug histories were not provided by any of the rural hospitals in 1991, while in 2001 48% of hospitals reported providing this service. Increases in the percentage of hospital pharmacy departments providing drug information services and participating in drug research were also notable. When these data are compared with national findings from the 2001 ASHP survey, the percentage of rural hospitals in Illinois providing pharmacokinetic consultations, nutrition support, patient education and monitoring, and written medication histories exceeds that of hospitals nationwide.[1]

The general increased provision of clinical pharmacy services in rural hospitals in Illinois may be attributable to a variety of factors. There has been an increased number of clini-

cally trained pharmacists in Illinois secondary to transition to the entry-level Pharm.D. degree. This transition occurred at the University of Illinois at Chicago in the mid-1980s. The increased number of clinically trained pharmacists may have resulted in a greater number of hospitals providing clinical pharmacy services. This change would be most notable in rural or small hospitals that did not previously provide clinical pharmacy services.

Another contributing factor may be the professionwide mandate of pharmaceutical care. Pharmaceutical care was first introduced in 1990, and its effects could be observable within the time period examined here.[6] The primary emphasis of pharmaceutical care is the responsibility of the pharmacist to patient care outcomes. Thus, the best measure of its impact is patient outcomes. However, the increased provision of clinical pharmacy services represents a process indicator that may provide preliminary evidence of the level of pharmaceutical care in this population.

In a series of noteworthy articles, Bond et al.[16,17] evaluated the possible association among certain clinical pharmacy services and mortality and drug costs in U.S. hospitals. That investigation identified two types of services that were associated with both reduced mortality and lower drug costs—drug information and drug histories. It is interesting that these same services are among those that have increased the most over the 10-year period of this survey. While the findings of the aforementioned studies were not available until 1999, it appears that the investments made in clinical pharmacy services were reasonable because of their potential clinical and economic benefits.

Other important findings of the 2001 survey relate to human resources and work-force issues. Despite the overall decline in the size and patient volume of hospitals in the survey population, staffing levels have not declined. For example, the ratio of budgeted pharmacist FTEs to operational beds increased from 1991 by approximately 67%. This finding may reflect an expansion of the scope of responsibility of pharmacy departments rather than a true increase in staffing levels relative to inpatient workload. For example, many respondents reported hospital ownership of home health care agencies, physician offices, long-term-care facilities, and hospice programs. Hospital pharmacy departments may provide services to all of these alternative sites, necessitating additional staffing. Thus, the number of staff per operational bed may not accurately reflect workload. Nevertheless, the improved ratio is a positive finding.

Vacancy rates for pharmacists and support staff in 2001 were also higher than those reported in 1991. However, the pharmacist vacancy rate of 14% is considerably less than the 21% vacancy rate reported by AHA in 2000.[4] This discrepancy may reflect an easing of the vacancy rate, or may be specific to Illinois or to rural hospitals. Respondents in our survey reported that vacancy rates for both pharmacists and support staff were unchanged compared with the previous year.

The work-force shortage has forced changes in the way pharmacy departments operate. Further, the vacancy rate may have a direct impact on patient outcomes. To accommodate vacancies, pharmacy departments have reduced the time spent providing clinical pharmacy services, expanded the use and roles of pharmacy technicians, and increased the use of overtime. While automation would seem a logical solution to the labor problem, it is one that has been used only to a moderate degree in respondent hospitals. While nearly 35% of respondents reported use of ADMs, fewer than 15% identified automation as necessitated by the work-force shortage. The size and financial status of some of these hospitals may make automation impractical.

Of particular interest is the effect of vacancies in the pharmacy on customers of pharmacy services. According to the respondents, vacancies commonly result in reduced job satisfaction of pharmacy staff, reduced physician and nursing staff satisfaction with pharmacy services, and increases in pharmacy-related medications errors. Clearly, this suggests a vicious cycle in which job dissatisfaction of pharmacy staff may lead to resignations that further exacerbate the work-force shortage. Of greatest concern is the effect that vacancies may have on the rate of medication errors. This is the first published study of which we are aware that suggests a link between pharmacy staff vacancies and increased medication errors, although anecdotal reports of such do exist. In an era of increased understanding and prevention of medication errors, any factor that may increase the occurrence of errors should be closely scrutinized. At minimum, these results point toward the need for additional research in this area.

Limitations

The response rate for the 2001 mail survey (66%) was considered quite satisfactory, even though it was less than the 81% response rate to the 1991 survey. Reasons for the lower response rate include lack of financial incentives, survey fatigue, and time limitations of the sample. To investigate the potential for nonresponse bias, we attempted to characterize nonrespondents versus respondents. To do this we abstracted data from the 2001 *AHA Guide* for all 71 hospitals in our survey population. Variables abstracted were admissions, births, census, outpatient visits, payroll, personnel, staffed beds, and total expense. The values of nonrespondents did not differ from respondents for any of the variables except for outpatient visits. Nonrespondents had significantly fewer outpatient visits in 2001 compared to

respondents (39,241.4 versus 66,752.6, respectively). However, given the overall similarities between the groups, we did not consider response bias to be a significant problem with this survey. We also acknowledged potential selection bias given that the same sample size and population were smaller than the 1991 cohort.

Attempts were made to define terms that might be interpreted differently by respondents. However, as with all mail surveys, the possibility exists that all respondents did not similarly interpret questions or terms. To measure the possibility of misinterpretation and errors in responses, we attempted to validate some of the self-reported survey responses. Certain variables reported on the survey questionnaire were also listed in the *AHA Guide* for each hospital and compared. These variables included census, operational or staffed beds, and outpatient visits. While differences in the mean values for each variable were observed in comparing reported values to the AHA data for respondents, these differences were not significant. These variables represent only a fraction of all of the data reported in the survey; however, the comparability of these data reflects positively on the probable validity of the entire data set.

In this survey rural hospitals were defined as those located in counties outside of an MSA. It is important to note that, with the 2000 Census, the U.S. Census Bureau redefined "rural" and "urban" on the basis of population density. An urban cluster, for example, has a population density of at least 1000 people per square mile, and rural was defined as "all territory, population, and housing units located outside of an urban cluster and an urban area." With this definition, geographic areas, such as counties, may contain both urban and rural territories. We attempted to assess the impact of this definition change on our survey population. When the new definition was applied to the population (all division 3 pharmacy licensees in Illinois), only 14 licensees were considered to be located in rural areas. Two of the 14 had previously been classified as urban because they were located in counties that were within an MSA. The difference between the two definitions is significant. However, we are not convinced that the new definitions accurately classify hospitals for the purpose of this survey. A small-town hospital in a county with a very low population density is an example. While a majority of the county is classified as rural by the new definition, the small town may have a population of 1000 people within a single square mile. The town itself is therefore considered urban, and the hospital would be classified as urban. Yet it could be argued that the hospital is rural because a majority of its patients originate from locations throughout the county.

Conclusion

A 2001 survey of pharmacy departments in rural hospitals in Illinois showed progression in the provision of distributive and clinical pharmacy services since 1991. Employee vacancy rates in pharmacy departments were higher in 2001, especially among pharmacist positions, but were lower than those reported for the general population of hospitals.

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