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EVALUATION OF TELECONFERENCING FOR CONTINUING PHARMACEUTICAL  
EDUCATION: SATISFACTION, KNOWLEDGE AND APPLICATION

BY

RUTH H. BRUSKIEWITZ

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UNIV. OF WISCONSIN

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**Abstract**

In the fall of 1986, Extension Services in Pharmacy at the University of Wisconsin, presented an eight lecture teleconference course entitled, "Therapy of Infectious Disease". A study was undertaken to evaluate this teleconference series as a method for the continuing education of pharmacists. Specific objectives were to evaluate: 1) the satisfaction with the delivery system; 2) the cognitive changes as a result of participation in the program; and 3) the application of knowledge gained to the pharmacist's practice setting. Overall, the study participants were satisfied with ETN as a method of continuing pharmaceutical education. Cognitive test results showed a significant improvement in the level of performance. Results evaluating the application of the knowledge gained from the teleconference course were less conclusive. There was a trend towards improvement in scores from presimulation to postsimulation. The improvement, however, was not statistically significant.

## Introduction

The first reported use of the telephone in a conference mode was in 1939 with the initiation of a program in Iowa to meet the needs of homebound and hospitalized students.<sup>1</sup> Teleconferencing, or group communication through electronic media, began at the university level in 1947.<sup>1</sup> Throughout the 1950's, educators experimented with many pilot programs in teleconferencing.<sup>1</sup>

By the 1960's the use of teleconferencing exploded, ushering in the University of Wisconsin's Educational Teleconference Network (ETN) in 1965, originally called the Educational Telephone Network. This delivery system was initially created to provide continuing education (CE) to physicians.<sup>2</sup> Wisconsin's ETN program utilizes the teleconference method of teaching whereby an amplified telephone call disseminates and shares information and ideas among groups of individuals assembled at various distant locations throughout the state.<sup>3</sup>

The 1970's fostered diversity and growth in teleconferencing while the general trend in the 1980's is towards its greater refinement and expanded potential.<sup>1</sup> Teleconferencing systems have stepped into areas which have exhibited a need for outreach services. Consequently, one finds a high incidence of such systems in the midwest and in other areas of the country characterized by sparsely populated and largely rural areas.<sup>1</sup>

Extension Services in Pharmacy has offered at least one teleconference course each academic year since ETN's first full academic year of operation (1966-1967). These courses reach 15-20% of

the registered pharmacists in Wisconsin, a state where CE is not mandated by the legislature.

Research on teleconferencing was originally pursued to determine its utility for business conference meetings. Not surprisingly, studies concluded that tasks low on interpersonal involvement are ideally suited to the use of teleconferencing for educational purposes.<sup>4</sup> Conversely, tasks high on interpersonal involvement are poorly conveyed via teleconferencing. Applications to the education of health care professionals became obvious.

Concern over the effectiveness of the teleconference medium spawned research which concluded that there was no difference in the amount of learning between the control group, taught by the traditional method, and the experimental group, taught via the telephone.<sup>5,6</sup> Various studies have reported the effectiveness, defined as an increase in knowledge and retention of the same, of the teleconference method for continuing education.<sup>7,8,9,10</sup> Other research considerations were the positive attitudes toward ETN for continuing education, the acceptability of the medium, and the amount of people reached.<sup>8,9,10</sup>

There have been no studies evaluating Wisconsin's ETN in recent years, an era which has seen significant changes in the quality of instruction via the teleconference method.

To date, the quality of telecommunication continuing education programs have been judged primarily according to the enrollment and attendance patterns of their participants.<sup>9,11</sup> Evaluations of physician continuing education programs have not confirmed that educational programming has in any way improved the delivery of care to

the patient, this being the ultimate measure of the worth of any CE program.<sup>12-13</sup> Belsheim mentions the gap that exists between the knowledge gain of a continuing professional medical education participant and the application of this knowledge to his medical practice.<sup>14</sup> The issue of the impact of continuing education on problem solving skills as applied to pharmacists has not been found to be reported in the literature.

In the attempt to evaluate the effect of continuing education on clinical problem solving skills and clinical competence, a suitable assessment tool is constantly being sought.<sup>15</sup> Clinical competence is defined as the attributes displayed by a health care professional in an encounter with an individual patient.<sup>15</sup> Although knowledge of facts is one aspect of competence, there is an enormous difference between performance on multiple choice questions and competent patient care.<sup>15</sup>

Patient Management Problems (PMPs) arose out of the need to measure, in a reliable fashion, components of clinical competence other than factual recall. PMPs simulate an actual clinical experience to measure not only knowledge but problem-solving skills. PMPs identify errors of omission and commission in order to establish the optimal pathway to clinical problem-solving. Limitations of PMPs include the lack of evidence regarding their validity.<sup>15-16-17-18</sup> Cueing in PMPs supplies written response options not present in actual practice situations. The participant is reminded to perform diagnostic tests to arrive at an appropriate diagnosis and is encouraged to request more tests than they ordinarily would have. The poorer student is rewarded with a higher score as a result of additional points gained.<sup>17</sup>

The validity of patient simulations is high.<sup>15</sup> Simulations provide an accurate and valid representation of an actual patient: a technique which minimizes the effects of cueing.<sup>15-17</sup> Simulations can be standardized, eliciting realistic feedback in a practical time frame.<sup>20</sup> A study relating a pharmacist's real-life performance with that of a simulation indicated that there was a relationship between solving strategies in the simulation and real-life.<sup>20</sup> Patient simulations have been shown to increase the precision measurement of clinical performance.<sup>21,22,23</sup>

This report details a study that was undertaken to evaluate the Educational Teleconference Network and the particular course design utilized by Extension Services in Pharmacy. Specific objectives were to evaluate: 1) the satisfaction with the delivery method of ETN; 2) the cognitive changes occurring as a result of participation in continuing education via teleconference; and 3) the application of knowledge gained to the pharmacist's practice setting.

### **Methodology**

The population for the study consisted of pharmacists enrolled in the ETN course, "Therapy of Infectious Disease", a series of eight lectures offered in the fall of 1986 at 77 locations around the state. Each evening's broadcast consisted of approximately one hour of prerecorded lecture material and one hour of an open microphone question and answer session. Pharmacists who registered early were sent a pretest and a consent form, agreeing to participate in the study by completing the pretest and a posttest, as well as two telephone

simulations. A study enrollment deadline was enforced, preceding the receipt of the course workbook and the commencement of the lecture series. Of the 255 pharmacists\* who were sent the invitation to participate in the study, 102 individuals volunteered by their completion and return of the two forms, for an initial response rate of 40.00%. The study and its consent form were approved by the University of Wisconsin Center for Health Sciences Human Subjects Committee (Appendix A).

Course evaluation. The first objective of the study, to determine participant satisfaction with the delivery method of ETN, was accomplished through the use of an evaluation instrument designed specifically for this study. It consisted of Likert scale and nominal questions previously developed and used on a variety of prior ETN evaluations (Appendix B). This instrument assessed the usefulness and applicability of the information to one's practice, the difficulty of the material presented and the suitability of the physical facilities. Demographic questions were included to ascertain information about the study participants.

Cognitive Changes. To evaluate knowledge change as a result of the program, the second study objective, a knowledge pretest and posttest were administered. Both tests consisted of 25 multiple choice and 15 true-false questions (Appendix C). Each test had identical questions, except for a rearrangement in their order. Five of the

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\* Total enrollment in the course was 420 individuals. Only 255

pharmacists registered early enough to be invited to participate. questions were used as controls to assess knowledge change independent of this course. The information tested by these questions was not covered in the course lectures. Five other questions tested information covered in one specific lecture of the course, on urinary tract infections (UTIs), which related to information treated in the simulations to be discussed later. The test questions were reviewed for accuracy, appropriateness and content validity by two physicians and two clinical pharmacy practitioner-educators.

Simulations. To fulfill the third objective, to evaluate clinical problem solving skills, a patient case simulation was developed and pretested on five pharmacy practitioners. To minimize learning bias resulting from the presimulation, two variations of the simulation were created involving females with uncomplicated urinary tract infections (Appendices D and E). Physical signs and symptoms were similar in the two cases. Case A, however, featured a pregnant female with no known drug allergies, while Case B featured a non-pregnant female with a sulfa allergy. The final treatment recommendation differed for the two cases.

Simulations were conducted via telephone by a single interviewer in an attempt to eliminate interviewer variability and to ensure simulation consistency and reproducibility. The simulations were conducted after a delay of one to two months in order to avoid possible bias inherent in contacting the participants immediately after the lecture.

In designing the simulations, the question arose as to whether or

not blinding the simulation would have any effect on the pharmacists' responses. Therefore, in the presimulation, 25 of the institutional practitioners were randomly assigned to receive a blinded simulation while the other institutional practitioners received an open simulation. Recipients of the blinded simulation were not informed that the symptomatic patient in question was part of the infectious disease teleconference study. Instead, the interviewer posed as a medical student telephoning the pharmacist for their recommendation for a patient who was examined in clinic with a suspected UTI.

Scoring for the simulations was determined by a consensus of four clinical pharmacy practitioner-educators after a review of the responses. Scores were assigned to simulation responses based on a modified weighing system previously defined by McGuire.<sup>24</sup> The weighting ranged from 0 to 10 with 10 the optimal score. Three areas were scored: 1) the initial decision to gather additional data, with a maximum attainable score of 10; 2) the actual data gathered, with a maximum attainable score of 47; and 3) the final treatment recommendation, with a maximum attainable score of 10. For either case simulation, the maximum attainable score was 67.

Statistics. Analysis was performed using parametric (paired and unpaired t-tests and ANOVAs) and non-parametric (Chi Square and Mann-Whitney U Test) procedures. All tests were performed with a .05 level of significance.

Response rates. The percentage of participants varied depending upon the portions of the study completed by the 102 pharmacists. Simulations were taken by 99 (97.06%) individuals, of which 93 (91.18%)

returned the evaluation instrument and cognitive tests.

## Results

Demographics. Table 1 represents the demographic information obtained on the participants. The majority of these individuals are institutional pharmacists and hold B.S. in Pharmacy degrees. The length of practice varied for the participants with half practicing less than 10 years (mean = 12.80 years  $\pm$  8.81).

Reasons for attending the teleconference program are presented in Table 2. The primary motivations for enrolling related to professional enrichment: 1) to enhance general knowledge; 2) to learn about new developments; and 3) to improve specific skills. Because Wisconsin retains voluntary participation in continuing pharmaceutical education, the need for mandatory credit was ranked the fourth most common reason for enrolling. This contrasts with previous national studies on remote learning where the vast majority of CE participants enroll primarily to fulfill mandatory requirements.<sup>25,26,27</sup> To determine if the need to complete CE requirements for out-of-state licensure influenced the participants' evaluations or performance on the test instruments, the classification on the lower half of Table 2 was used in the analysis of the study data.

All evaluation and cognitive test results were analyzed for differences based on the demographics presented above. Unless otherwise stated, statistically significant differences were not found.

Course evaluations. The total results of a series of Likert scale evaluation statements and nominal questions are presented in Tables 3

and 4 respectively. Overall, the responses were positive, with the vast majority (93.47%) of the participants agreeing that the course was very worthwhile. Similarly, most pharmacists (85.87%) agreed that the course contents were directly applicable to their professional practice.

With respect to the specific course design and its delivery method, the following either agreed or strongly agreed with statements that: 1) the time provided for the open microphone question session was adequate (97.83%); 2) the listening location attended was an excellent physical facility (82.61%); and 3) the quality of the ETN reception was satisfactory (96.74%).

In the early years of pharmacy CE by teleconference, slides were used to augment the lectures. The use of slides necessitated extensive note taking. Currently, supplemental course materials are compiled into a workbook and mailed to the participant well in advance of the lectures. With outlines of the lectures supplied, note taking is reduced to a minimum. References and suggested readings for each lecture are also provided. The most positive response was in regards to the course workbook, with 94.56% of the participants considering the workbook a valuable supplement to the oral broadcast.

As seen in Table 3, the pharmacists felt that the course contents were presented in sufficient depth (71.43% agreeing with the statement). In Table 4, most of the participants thought that the material presented was satisfactory for their experience and background. There were significant differences in the pharmacists' evaluation of this last point on the basis of both educational

background and practice setting. Pharmacists with a post-B.S. degree ( $\chi^2 = 12.32, df=2, p<0.01$ ) and those in institutional settings ( $\chi^2 = 7.21, df=2, p<0.05$ ) were more likely to feel that the material was too elementary.

As a result of the course, most participants (82.61%) agreed that they had a greater understanding of the nature and management of infectious diseases. All of the pharmacists felt that they would be able to use the course materials in their present practice (Table 4). Pharmacists generally agreed (85.87%) that the ETN system provided an adequate method for communicating the type of subject matter covered in the course. Approximately half (55.43%) felt that this delivery system was as effective as conventional live lecture programs while 15.22% thought that it was more effective.

The major advantage of this delivery system is its ease of access to pharmacists throughout the state. Yet, only 39.13% of the participants felt that they could not get the information in any other way.

Additional measures of satisfaction with the delivery system were demonstrated by the observations that: 1) the participants were likely to recommend this delivery system for continuing education to a colleague (87.00% agreement) and 2) all the pharmacists indicated that they would enroll in a future ETN series if the topic was of interest to them.

Cognitive test results. Reliability of the test instrument was 0.61 (coefficient alpha): Table 5 illustrates the total results for the knowledge test portion of the study. There was a significant

increase from the pretest level to the posttest, both for total question scores and question scores without the five control questions. Although not as dramatic an improvement, there was a significant increase on control questions only. This may be attributed to supplemental readings and independent study initiated through the course work, or the effect of pretesting. Lastly, there was a significant increase in the pharmacists' correct responses to the questions related to UTIs, used in the simulation portion of the study.

With one exception, there were no significant differences on the pretest scores based on the demographic variables analyzed. Pharmacists with Post-B.S. degrees did significantly better than their B.S. colleagues on both the total pretest ( $t=2.02$ ,  $df=91$ ,  $p<0.05$ ) and pretest without control questions ( $t=2.18$ ,  $df=91$ ,  $p<0.05$ ).

On the posttest scores (including control and UTI questions) there were no significant differences comparing the demographic variables. Thus, for this specific course, the ETN delivery system was equally effective in increasing the pharmacists' knowledge, independent of practice setting or experience, educational background, previous exposure to the system, or motivation to enroll.

Simulation results. Maximum scores for the blinded versus the open presimulations were compared to determine if participants who knew that they were responding to the study simulation would answer differently than those who were unaware of the study situation. There was no significant difference found between the maximum scores of the blinded and the open presimulations. Thus, all postsimulations were conducted in the open, with the interviewer identifying himself as

connected with the teleconference study.

Total scores were calculated for the simulations, as well as for three sub-score components: the initial decision to gather more data, the data gathered and the final treatment recommendation. Table 6 illustrates simulation score results as an indication of practice application. In combining Cases A and B to compare presimulation performance with that of postsimulation performance for all study participants, the total maximum scores (presimulation total mean =  $15.41 \pm 12.83$ , postsimulation total mean =  $17.02 \pm 13.33$ ) and the three specific areas show an improvement. The gain however, was not statistically significant.

In addition to the specific control questions in the knowledge tests, used to determine if any learning resulted from the effects of the pretest itself, the study had, by nature of its voluntary participation, control subjects. These participants completed all aspects of the study except attendance at the specific lecture on urinary tract infections. Thirteen of the 99 simulation participants were control subjects. This study, however, did not control for participants who missed the lecture but may have listened to an audio cassette replay of the lecture, discussed it with colleagues or pursued independent study of the UTI material. Although a comparison of the control participant results presimulation (total mean =  $15.06 \pm 12.58$ ) and postsimulation (total mean =  $16.34 \pm 12.79$ ) showed an improvement as illustrated in Table 6, the results were not statistically significant. Likewise, a comparison of the total simulation scores of the control group with those of the experimental group, were not

statistically significant.

To assess the impact of case simulation type as an indicator of performance, Table 7 further illustrates the actual simulation scores, separated according to Case A or B. Participant scores demonstrate an improvement from presimulation to postsimulation for Cases A and B in the total maximum scores and the data gathering scores. In the presimulation scores, those participants who took Case A did not achieve the same level of performance as those who took presimulation Case B. Although the initial decision to gather more information was consistent from Case A to Case B, the difference appeared to be rooted in the inability to gather appropriate data to determine that the patient was pregnant and to follow up with an appropriate recommendation for treatment. Participants had to elicit information about the patient's physical exam or medication history in order to learn of her pregnancy.

Presimulation Case B participants improved their performance on the postsimulation with Case A but the change was not as pronounced as that of presimulation Case A to postsimulation Case B. The problem was based in the recommendation for treatment with Case A, as postsimulation final recommendation scores actually decreased. Postsimulation performance scores demonstrate that the difference between the two cases with respect to total maximum scores was not as great as presimulation performance scores. Postsimulation scores do however, reflect an inadequate ability to gather data for Case B and an inability to make a correct treatment recommendation for Case A. Although the overall trend was towards an improvement in simulation

scores, the improvement was not statistically significant.

Total maximum simulation scores were analyzed for differences based on the demographic variables. No statistically significant differences were found.

### Summary

Overall, the study participants, independent of their practice site or years as a registered pharmacist, agreed that ETN is an acceptable means to deliver continuing pharmaceutical education. General knowledge enhancement, new developments in drug therapy and the applicability of the information to the participant's practice were important factors in the pharmacists' enrollment in the course and may continue to be factors for future enrollment. Cognitive test results showed a significant improvement in the level of performance. Results of the evaluation of the application of the knowledge gained from the ETN course were less conclusive. There was a trend toward improvement in scores from presimulation to postsimulation. The improvement, however, was not statistically significant. Limitations of the study included the fact that the study population was not a true cross sampling of pharmacists in the course, but rather those who registered early enough to be invited to participate. Because participation was voluntary, the design may have selected out pharmacists who were more motivated than their colleagues.

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Table 1.  
Demographics of Participants

	<u>n*</u>	<u>%</u>
PRACTICE SITE		
Institutional (hospital and nursing home)	63	68.48
Ambulatory Care (chain, independent, clinic)	<u>29</u>	<u>31.52</u>
Total	92	100.00
EXPERIENCE (years as a registered pharmacist)		
< 10	46	50.00
10 - 19	26	28.26
20 - 29	13	14.13
30 +	<u>7</u>	<u>7.62</u>
Total	92	100.00
TYPE OF DEGREE		
B.S. Pharmacy	82	88.17
Post B.S. (M.S. and Pharm.D.)	<u>11</u>	<u>11.83</u>
Total	93	100.00
PAST EXPERIENCE WITH ETN SYSTEM		
No experience	17	18.27
Some experience (1 or 2)	21	22.58
Much experience (3 or more)	<u>55</u>	<u>59.14</u>
Total	93	100.00

\*Differences in totals are accounted for by non-respondents.

Table 2.  
Motivation for Attending Teleconference Programming

Rank	Reason	Number of Respondent Choices			Rank Weight <sup>a</sup>
		1st	2nd	3rd	
1	To enhance my general knowledge	49	28	13	216
2	To learn about new developments in drug therapy	21	42	21	168
3	To improve specific skills	10	11	28	80
4	To fulfill mandatory continuing education requirements	10	8	11	57
5	To exchange ideas with other pharmacists	1	1	6	11
6	To get help with a specific problem	2	1	1	9
7	Other reasons (not specified)	0	0	2	2

Impact of Mandatory CE for Statistical Comparisons:

Not motivated by mandatory CE	<u>n</u>	<u>%</u>
	64	68.82
Mandatory CE as a lesser factor	19	20.43
Primarily because of mandatory CE	<u>10</u>	<u>10.75</u>
Total	93	100.00

<sup>a</sup>Weight based on the sum of three times the number of first choices, two times the number of second choices and one times the number of third choices.

Table 3.  
Overall Evaluation Statement Results

<u>Evaluation Statement*</u>	<u>n</u>	<u>Mean</u>	<u>S.D.</u>	<u>%<sup>b</sup></u>
Overall, I found this ETN course to be very worthwhile.	92	4.13	0.67	93.47
The material covered in this course was directly applicable to my professional practice.	92	4.01	0.78	85.87
The amount of time provided for questions and answers was sufficient.	92	4.24	0.48	97.83
The facilities at the listening location were excellent (seating, size, conducive for learning).	92	3.90	0.76	82.61
The mechanical quality (line noise, etc.) of the ETN reception was satisfactory.	92	4.26	0.51	96.74
The workbook was a valuable addition to the course content.	92	4.47	0.60	94.56
Within the time limitations, the lecturers covered the course content in sufficient depth.	91	3.64	0.77	71.43
As a result of this program, I have a greater understanding of the nature of infectious diseases and their management.	92	3.89	0.60	82.61
The ETN system seems to be adequate for communicating the type of subject matter presented.	92	3.96	0.57	85.87
It would have been difficult for me to get the information presented in this program in any other way.	92	3.10	1.00	39.13
Would you recommend this type of program (ETN delivery system) to a colleague?	92	4.13	0.73	87.00

\*Based on a 5-point Likert scale with 5 = strongly agree; 4 = agree; 3 = uncertain; 2 = disagree; 1 = strongly disagree

<sup>b</sup>Percentage of participants who either strongly agreed (5) or agreed (4) with the statement.

Table 4.  
Overall Evaluation Question Results

<u>Evaluation Question</u>	<u>n*</u>	<u>%</u>
Considering your experience and background, was the material presented:		
Too elementary	8	8.69
Satisfactory	80	86.96
Too technical	<u>4</u>	<u>4.35</u>
Total	92	100.00
Do you anticipate using what you learned in this course in your professional practice?		
Definitely	55	61.80
Possibly	34	38.20
Probably not	0	-
Definitely not	<u>0</u>	<u>-</u>
Total	89	100.00
Do you think this particular course would have been more or less effective as a conventional face-to-face meeting?		
More effective	27	29.35
As effective	51	55.43
Less effective	<u>14</u>	<u>15.22</u>
Total	92	100.00
If the topics are of interest to you, will you enroll in future ETN courses?		
Definitely	70	76.92
Possibly	21	23.08
Probably not	0	-
Definitely not	<u>0</u>	<u>-</u>
Total	91	100.00

\*Differences in totals are accounted for by non-respondents.

Table 5.  
Cognitive Test Results

Matched Pair Comparisons (n=93)	Percent Correct		<u>t</u>	<u>p</u>
	<u>Mean</u>	<u>S.D.</u>		
Total Test Questions <sup>a</sup>				
Pretest	66.84	10.61	12.17	<0.001
Posttest	81.12	10.06		
Test Questions without controls <sup>b</sup>				
Pretest	67.83	11.25	11.91	<0.001
Posttest	82.75	9.75		
Control Questions Only <sup>c</sup>				
Pretest	60.86	16.40	4.34	<0.001
Posttest	70.10	20.56		
Specific UTI Questions <sup>d</sup>				
Pretest	69.46	16.04	6.61	<0.001
Posttest	81.13	15.56		

<sup>a</sup>Total questions equal 40.

<sup>b</sup>Questions without controls equal 35.

<sup>c</sup>Control questions equal 5.

<sup>d</sup>UTI questions equal 5.

Table 6.  
Simulation Score Results  
Experimental and Control Participants

	Presimulation			Postsimulation		
	<u>Mean</u>	<u>S.D.</u>	<u>Range</u>	<u>Mean</u>	<u>S.D.</u>	<u>Range</u>
Total Maximum Score <sup>a</sup>	15.41	12.83	0-54	17.02	13.33	0-56
Initial Decision <sup>b</sup>	6.67	4.74	0-10	6.77	4.70	0-10
Data Gathering <sup>c</sup>	6.92	7.69	0-34	7.99	7.67	0-36
Final Recommendation <sup>d</sup>	1.83	3.07	0-10	2.25	3.63	0-10

Simulation Score Results  
Experimental Participants

	Presimulation			Postsimulation		
	<u>Mean</u>	<u>S.D.</u>	<u>Range</u>	<u>Mean</u>	<u>S.D.</u>	<u>Range</u>
Total Maximum Score <sup>a</sup>	15.06	12.58	0-54	16.34	12.79	0-56
Initial Decision <sup>b</sup>	6.63	4.76	0-10	6.74	4.71	0-10
Data Gathering <sup>c</sup>	6.67	7.53	0-34	7.63	7.53	0-36
Final Recommendation <sup>d</sup>	1.78	2.94	0-10	1.95	3.41	0-10

<sup>a</sup>Total maximum score attainable is 67.

<sup>b</sup>Total initial decision score attainable is 10.

<sup>c</sup>Total data gathering score attainable is 47.

<sup>d</sup>Total final recommendation score attainable is 10.

Table 7.  
Simulation Score Results By Case  
Experimental and Control Participants

	Presimulation <sup>a</sup>				Postsimulation			
	Case A n = 51		Case B n = 48		Case A n = 48		Case B n = 51	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Total Maximum Score <sup>b</sup>	14.20	11.46	16.71	14.15	17.15	12.78	16.90	13.97
Initial Decision <sup>c</sup>	6.68	4.76	6.67	4.76	7.08	4.59	6.47	4.83
Data Gathering <sup>d</sup>	6.20	6.76	7.69	8.57	8.48	7.98	7.53	7.41
Final Recommendation <sup>e</sup>	1.37	3.07	2.35	3.01	1.56	3.45	2.90	3.71

- <sup>a</sup>Participants who took presimulation Case A, took postsimulation Case B and participants who took presimulation Case B, took postsimulation Case A.
- <sup>b</sup>Total maximum score attainable is 67.
- <sup>c</sup>Total initial decision score attainable is 10.
- <sup>d</sup>Total data gathering score attainable is 47.
- <sup>e</sup>Total final recommendation score attainable is 10.

Table 8.  
Simulation Score Results By Case  
Experimental Participants

	Presimulation <sup>a</sup>				Postsimulation			
	Case A n = 43		Case B n = 43		Case A n = 43		Case B n = 43	
	<u>Mean</u>	<u>S.D.</u>	<u>Mean</u>	<u>S.D.</u>	<u>Mean</u>	<u>S.D.</u>	<u>Mean</u>	<u>S.D.</u>
Total Maximum Score <sup>b</sup>	12.88	10.83	17.23	13.91	15.70	12.78	16.98	12.92
Initial Decision <sup>c</sup>	6.28	4.89	6.98	4.65	6.51	4.82	6.98	4.65
Data Gathering <sup>d</sup>	5.49	6.18	7.86	8.58	6.67	6.66	8.58	8.27
Final Recommendation <sup>e</sup>	1.16	2.72	2.40	3.06	2.51	3.43	1.40	3.33

<sup>a</sup>Participants who took presimulation Case A, took postsimulation Case B and participants who took presimulation Case B, took postsimulation Case A.

<sup>b</sup>Total maximum score attainable is 67.

<sup>c</sup>Total initial decision score attainable is 10.

<sup>d</sup>Total data gathering score attainable is 47.

<sup>e</sup>Total final recommendation score attainable is 10.

APPENDIX A  
CONSENT FORM

This study is designed to evaluate the value and effectiveness of the Wisconsin Educational Teleconference Network. Study requirements include: 1) completion of a premeasurement; 2) completion of a postmeasurement; and 3) response to two phone simulations during the course. Regarding the phone simulations, you will be receiving two telephone calls from either a simulated patient or physician regarding information about therapy for a particular disease state. All responses will be held in strictest confidence.

AUTHORIZATION

I, \_\_\_\_\_, have read the information above and on the cover letter and decide to participate in the research project which was described, including the telephone simulations. My signature also indicates I have received a copy of this consent form.

\_\_\_\_\_  
Participant Signature

\_\_\_\_\_  
Date

Principal Investigator: Ruth H. Bruskiwitz (608) 263-1282  
Pharmacy Resident

Clinical Faculty Advisor: Larry E. Boh, M.S. (608) 263-1279  
Clinical Assistant Professor

Graduate School Advisor: James E. De Muth, Ph.D. (608) 262-2422  
Professor  
School of Pharmacy  
University of Wisconsin-Madison

## APPENDIX B

## EVALUATION INSTRUMENT

1. Number of years as a Registered Pharmacist? \_\_\_\_\_ years
2. Educational background (please check degree(s) received):  
 B.S. Pharmacy Degree  
 Pharm.D. degree  
 M.S. Pharmacy Degree
3. What is your primary practice site?  
 Independent community pharmacy  
 Chain community pharmacy  
 Hospital  
 Nursing Home  
 Health Maintenance Organization  
 Other, please specify \_\_\_\_\_
4. Listed below are several potential reasons for attending this year's ETN course. Please rank (first, second or third) your major purpose(s) in attending the program (rank up to three reasons):  
 To get help with a specific problem  
 To learn about new developments in drug therapy  
 To improve specific skills  
 To enhance my general knowledge  
 To exchange ideas with other pharmacists  
 To fulfill mandatory continuing education requirements  
 Other, please specify \_\_\_\_\_
5. Have you attended a telelecture before? (check appropriate answer)  
 no     yes, one or two     yes, several

Please indicate your degree of agreement with each statement below as it applies to the course as a whole by recording the appropriate number from the following scale on the line in front of each statement.

Strongly Agree 5	Agree 4	Uncertain 3	Disagree 2	Strongly Disagree 1
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- \_\_\_\_\_ 1. Overall, I found this ETN course to be very worthwhile.
- \_\_\_\_\_ 2. As a result of this program, I have a greater understanding of the nature of infectious diseases and their management.
- \_\_\_\_\_ 3. The ETN system seems to be adequate for communicating the type of subject matter presented.

- \_\_\_ 4. It would have been difficult for me to get the information presented in this program in any other way.
- \_\_\_ 5. The material covered in this course was directly applicable to my professional practice.
- \_\_\_ 6. The workbook was a valuable addition to the course content.
- \_\_\_ 7. Within the time limitations, the lecturers covered the course content in sufficient depth.
- \_\_\_ 8. The amount of time provided for questions and answers was sufficient.
- \_\_\_ 9. The mechanical quality (line noise, etc) of the ETN reception was satisfactory.
- \_\_\_ 10. The physical facilities at the listening location were excellent (seating, size, conducive for learning).
- \_\_\_ 11. Would you recommend this type of program (ETN delivery system) to a colleague?

Please check the most appropriate response to each of the following questions:

1. Do you think this particular course would have been more or less effective as a conventional face-to-face meeting?  
 \_\_\_ more effective    \_\_\_ as effective    \_\_\_ less effective
2. Do you anticipate using what you learned in this course in your professional practice?  
 \_\_\_ definitely    \_\_\_ possibly    \_\_\_ probably not    \_\_\_ definitely not
3. Considering your experience and background, was the material presented  
 \_\_\_ too elementary    \_\_\_ satisfactory    \_\_\_ too technical
4. If the topics are of interest to you, will you enroll in future ETN courses?  
 \_\_\_ definitely    \_\_\_ possibly    \_\_\_ probably not    \_\_\_ definitely not

## APPENDIX C

## PRETEST AND POSTTEST QUESTIONS

DIRECTIONS: Answer the following by circling the one correct answer for each question. Please do not refer to any textbooks, the course workbook or other reference sources.

1. Factors which promote development of new antibiotic compounds include all of the following except:
  - a. Emergence of pathogens resistant to multiple antibiotics.
  - b. Immunocompromised patients developing new and complex infections.
  - c. Commercial incentives for manufacturers to produce new agents.
  - d. Legislative mandates.
  - e. Physician and patient demands for new agents for outpatient IV use.
  
2. For which of the following type of antibiotics is dose adjustment necessary in patients with moderate impairment of hepatic function?
  - a. Those excreted via the biliary tract (if hyperbilirubinemia exists).
  - b. Those which are acetylated or deacetylated.
  - c. Those which are oxidized via microsomal enzymes.
  - d. A and C
  
3. Which one of the following statements is false regarding nonspecific urethritis?
  - a. It is one of the most common sexually transmitted diseases diagnosed in men.
  - b. Treatment can occur with a minimum of seven days of tetracycline.
  - c. Chlamydial causes are easy to detect with microscopic or laboratory smear tests.
  - d. Clinical symptoms could include a urethral discharge or dysuria.
  - e. None of the above
  
4. Which of the following antibiotics should be avoided in treating young children with a skin infection?
  - a. Cefotaxime
  - b. Doxycycline
  - c. Erythromycin
  - d. Methicillin
  
5. Pseudomonas pneumonia is best treated with:
  - a. An antipseudomonal penicillin plus aminoglycoside.
  - b. Cefazolin plus an aminoglycoside.
  - c. Ampicillin plus chloramphenicol.
  - d. Ceftazidime plus cefoperazone.
  - e. Cefotaxime alone.

6. Which of the following oral medications is not an accepted practice for prophylaxis against traveler's diarrhea?
- Pepto-Bismol
  - Cephalexin
  - Trimethoprim/sulfamethoxazole
  - Doxycycline
7. Patients receiving which one of the following should be cautioned that discoloration of their urine may occur?
- Phenazopyridine
  - Nitrofurantoin
  - Dicloxacillin
  - Norfloxacin
8. Which of the following is not a good recommendation to parents administering antibiotics to children and infants?
- Add dose to full 8 oz bottle of formula.
  - Give medication prior to formula.
  - Administer via oral syringe placed inside cheek.
  - May crush tablets between 2 spoons and administer with small amount of applesauce or jelly.
9. Which one of the following oral antimicrobials would have predictably good activity against Pseudomonas aeruginosa?
- Amoxicillin
  - Sulfisoxazole
  - Cephalexin
  - Indanyl carbenicillin
10. Clindamycin and metronidazole are both active against gram-negative anaerobic bacteria, but differ in that:
- Metronidazole is also active against many gram-negative aerobic bacteria.
  - Clindamycin is also active against many gram-negative aerobic bacteria.
  - Clindamycin is also active against many gram-positive aerobic bacteria.
  - Metronidazole has superior activity against fusobacterium and actinomyces spp.
11. Patients receiving antacid therapy may not benefit from therapy with which of the following agents due to impaired bioavailability?
- Griseofulvin
  - Ketoconazole
  - Tetracycline
  - Both a and c
  - Both b and c

12. In order to adjust the dose of an antibiotic in a patient with impaired renal function, we must estimate:
- The usual daily dose of the drug.
  - The patient's creatinine clearance (CrCl).
  - The fraction of drug excreted unchanged in the urine.
  - All of the above
  - None of the above
13. Metronidazole could be used for the treatment of all of the following except:
- Trichomoniasis
  - Amebiasis
  - Giardiasis
  - Bacterial vaginosis
  - Candidiasis
14. Whirlpool-associated Pseudomonas folliculitis should be treated initially with
- Oral carbenicillin
  - Good hygiene and no antibiotics
  - Gentamicin alone
  - Ticarcillin + tobramycin
15. Which parameters should be monitored to detect adverse effects in patients receiving prolonged (more than 6 months) therapy with nitrofurantoin?
- Neurological function and signs of gynecomastia
  - Respiratory symptoms (or chest x-ray) and signs of gynecomastia
  - Respiratory symptoms (or chest x-ray) and neurological function
  - Hematocrit and neurological function
  - Hematocrit and respiratory symptoms (or chest x-ray)
16. Which of the following would not be an indication for inpatient therapy (hospitalization) for a woman with acute pelvic inflammatory disease?
- The patient has both gonorrhea and chlamydia.
  - The patient is pregnant.
  - Compliance problems with oral medications are likely.
  - A pelvic abscess is suspected.
  - The patient has been previously treated as an outpatient without improvement.
17. Severe cases of Legionella pneumonia in adults should be initially treated with:
- Erythromycin 250 mg IV every 8 hours.
  - Erythromycin 1 gm IV every 6 hours.
  - Trimethoprim-sulfamethoxazole 2 tablets every 12 hours.
  - Tetracycline 1 gm IV every 4 hours.
  - Chloramphenicol 1 gm IV every 6 hours.

18. Although any antimicrobial can produce a "chemical" diarrhea, the most common cause of antibiotic associated colitis is:
- Toxins produced by enterotoxigenic E.coli.
  - Invasion of the gut wall by Staphylococcus aureus.
  - Bile acids produced by action of bacteria resistant to antimicrobials on bile salts.
  - Toxin produced by Clostridium difficile.
19. Which one of the following reactions will not be predicted by penicillin skin testing procedures?
- Contact dermatitis
  - Angioedema
  - Anaphylaxis
  - Urticaria
20. Adjustment of the daily dose of antibiotics in patients with renal dysfunction is best performed by:
- Giving the usual dose, but less frequently.
  - Giving a smaller dose at the usual frequency.
  - Either technique may be used.
  - None of the above.
21. A patient who develops a rash on exposed areas of the skin after spending an extended period of time in direct sunlight may have been receiving which one of the following antibiotics?
- Penicillin VK
  - Erythromycin stearate
  - Cefadroxil
  - Metronidazole
  - Doxycycline
22. Which one of the following sexually transmitted diseases is still incurable?
- Genital herpes simplex
  - Syphilis
  - Giardiasis
  - Bacteria vaginosis
  - None of the above
23. Chronic polymicrobial sinusitis is best treated with:
- Oral chloramphenicol.
  - Surgical drainage and ancillary antibiotic therapy.
  - Irradiation.
  - One week of parenteral vancomycin.
  - Four weeks of oral vancomycin.
24. Which of the following is the drug of choice for impetigo?
- Dicloxacillin
  - Clindamycin
  - Cephadrine
  - Penicillin

25. Imidazole antifungal agents such as ketoconazole and miconazole are superior to griseofulvin and tolnaftate in that in addition to dermatophytes they possess activity against
- Candida spp.
  - Trichophyton
  - Epidermophyton
  - Microsporum
  - All of the above

DIRECTIONS: Answer the following by indicating at the left of each question whether the statement is TRUE OR FALSE.

- \_\_\_ 26. One possible therapeutic approach to septic arthritis due to Neisseria gonorrhoeae is the use of oral erythromycin.
- \_\_\_ 27. An acceptable outpatient therapy for otitis media is chloramphenicol.
- \_\_\_ 28. It is impossible to choose an antimicrobial for the treatment of uncomplicated urinary tract infections unless results of culture and sensitivity tests are available.
- \_\_\_ 29. Because of antigenic drift, the antigens in influenza vaccine can fail to provide protection, even if they have the same hemagglutinins and neuraminidases, as the vaccine from a previous year.
- \_\_\_ 30. Doxycycline is the treatment of choice for a pregnant woman with mucopurulent cervicitis.
- \_\_\_ 31. Epididymitis in men over 35 years old is usually caused by chlamydia.
- \_\_\_ 32. Patients treated with a single dose of TMP/sulfa for uncomplicated urinary tract infection have a higher relapse rate than those treated with a ten day course of this drug.
- \_\_\_ 33. Antihistamine or dopamine administration may interfere with penicillin skin testing results.
- \_\_\_ 34. The addition of clavulanic acid to amoxicillin to create Augmentin extends its spectrum to includes both Staphylococcus aureus and Pseudomonas aeruginosa.
- \_\_\_ 35. Single dose antibiotic therapy is acceptable for the treatment of uncomplicated urinary tract infections in pregnant patients.
- \_\_\_ 36. Even though the new pneumococcal vaccine has 7 more serotypes than the old vaccine, the new vaccine should not be given to those who have received the older pneumococcal vaccine.
- \_\_\_ 37. An asplenic patient should receive both pneumococcal and meningococcal vaccines.

- \_\_\_\_ 38. With exception of patients with antibiotic associated colitis or ulcerative colitis, patients can safely be given Lomotil to decrease frequency of stools.
- \_\_\_\_ 39. Once a patient is allergic to penicillin, (s)he will always be allergic to penicillin.
- \_\_\_\_ 40. The most widely used method of dosing antibiotics in pediatrics is based on body surface area.

## APPENDIX D

## SIMULATION CASE A

The patient is a 30 year old female whose current complaint is painful urination and increased urinary frequency for the last 24 hours. I suspect that she has a urinary tract infection.

- 1) What would you recommend for this patient?
- 2) What drug, dose, route and duration of therapy would you suggest?

HPI: Burning and frequency for the last 24 hours. No back pain, fever, chills or vaginal discharge.

PMH: First episode of UTI. No previous medical problems. NKDA.

Current meds: Stuart Prenatal multivitamin, one PO every day.

PE: Vital signs normal. No CVA tenderness. Patient is 34 weeks pregnant. Ht = 5'4", Wt = 64kg.

Labs: WBC 6000 (segs 55%, bands 10%). Lytes WNL.  
Renal, liver function WNL.  
U/A: no glucose, RBC, WBC, casts.  
Urine culture and sensitivities pending.

## APPENDIX E

## SIMULATION CASE B

The patient is a 25 year old female whose current complaint is painful urination and increased urinary frequency for the last 24 hours. I suspect that she has a urinary tract infection.

- 1) What would you recommend for this patient?
- 2) What drug, dose, route and duration of therapy would you suggest?

HPI: Burning and frequency for the last 24 hours. No back pain, fever, chills or vaginal discharge.

PMH: First episode of UTI. No previous medical problems.  
Sulfa allergy: rash.

Current meds: Ortho-Novum 7/7/7.

PE: Vital signs normal. No CVA tenderness. Ht = 5'6", Wt = 60kg.

Labs: WBC 6000 (segs 55%, bands 10%). Lytes WNL.  
Renal, liver function WNL.  
U/A: no glucose, RBC, WBC, casts.  
Urine culture and sensitivities pending.