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Celia P. MacDonnell
University of Rhode Island

Anita Jackson Derreza
University of Rhode Island

Mary D. Lavin
University of Rhode Island, marylavin@uri.edu

Steven A. Cohen

Lisa Cohen

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Impact of an Interdisciplinary Practice Laboratory on Pharmacy and Nursing Students' Perceptions of Health Care Roles

Impact of an Interdisciplinary Practice Laboratory on Pharmacy and Nursing Students' Perceptions of Health Care Roles

Celia P. MacDonnell, PharmD, Clinical Associate Professor/Director of Student Affairs, University of Rhode Island, Kingston, RI

Anita Jackson Derreza, PharmD, Clinical Assistant Professor, University of Rhode Island, Kingston, RI

Mary D. Lavin, MS, RNP, Clinical Associate Professor, University of Rhode Island, Kingston, RI

Steven A. Cohen, Dr.PH, MPH, Assistant Professor, Tufts University School of Medicine, Boston, MA

Lisa Cohen, PharmD, CDE, Clinical Assistant Professor, University of Rhode Island, Kingston RI

Abstract

Objectives: Evaluate students' perceptions of healthcare roles before and after participation in an interdisciplinary diabetes practice laboratory.

Methods: Third-year nursing and third-professional-year (P3) pharmacy students were assigned to interdisciplinary groups to participate in a patient-centered laboratory practicum. Students were provided with a didactic review of medication therapy for diabetes. Following the lecture small student groups rotated through four diabetes management practice stations (inhaled insulin, subcutaneous injection, blood glucose monitors, and insulin pens) and collaboratively reviewed diabetes case studies to formulate care plans. A pre-and-post survey to assess the students' clinical confidence and perceptions of health care roles was administered. The data was assessed for differences in student responses following the completion of the interdisciplinary laboratory. Two-sample t-tests were used to analyze pre-and post-data and to compare responses by discipline.

Results: Student perceptions significantly changed after participation in an interdisciplinary practice laboratory.

Conclusions: Interprofessional education, specifically in an interdisciplinary practice laboratory, may help foster a greater understanding of the knowledge and skills each health care practitioner offers and improve student confidence of clinical skills.

Key words: Interdisciplinary, Laboratory, Diabetes, Pharmacy, Nursing

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Introduction

In 2001, the Institute of Medicine (IOM) released a report recommending dramatic change in the United States healthcare system. “Crossing the Quality Chasm: a New Health System for the 21st Century ” delineated the process necessary for improvement in the quality of patient care as well as patient safety.[1] In this report the authors identified six goals for improving the delivery of patient care and subsequently enhancing health outcomes. Included in these goals were recommendations for increased interdisciplinary collaboration to improve information exchange and coordination of patient care.[1] Over the next several years the IOM continued its healthcare reform campaign and included recommendations for restructuring the clinical education of health professionals.

The Committee of Health Professions Education Summit was held in June 2002, which included 150 multidisciplinary healthcare educators.[2] The attendees discussed strategies for integrating a core set of competencies into the curriculum of future healthcare professionals. An important core competency described is the ability of professionals to cooperate, collaborate, communicate, and integrate care as part of an interdisciplinary healthcare team. Interdisciplinary teams have demonstrated improvements in the quality of patient care as well as decreases in costs, length of hospital stay, and medical errors.[2]

Interprofessional education (IPE) is considered an integral process in preparing students to provide collaborative patient care in a team environment.[3] The Centre for the Advancement of Interprofessional Education (CAIPE) encourages development of educational opportunities created jointly by two or more health professions in order to foster collaborative learning.[4] These opportunities should include reflective interaction among students in order to promote shared decision-making and responsibility for patient care.[3,4] A recent Cochrane review acknowledges a small number of heterogeneous studies that demonstrate the benefit of IPE, including such outcomes as reducing medical errors in the emergency department and improving mental health practitioners competencies related to delivery of care.[5] The authors recommend more rigorous IPE studies in order to provide evidence of the impact on patient outcomes.

This article focuses on an innovative student IPE opportunity for two health care disciplines, pharmacy and nursing. The Accreditation Council for Pharmacy Education (ACPE) standards and guidelines promote IPE as part of Guideline 9.1, encouraging colleges and universities to “ensure that the curriculum addresses…competencies needed to work as a member of or on an interprofessional team.”[6] Including IPE in college curricula has also become a focus of the American Association of Colleges of Pharmacy (AACP), resulting in the development of a task force to support and promote competency in IPE.[3] The American Association of Colleges of Nursing (AACN) standards entitled *The Essentials of Baccalaureate Education for Professional Nursing Practice* include a focus on IPE as an imperative competency for patient-centered care.[7] Nursing Essential VI promotes IPE as an opportunity for the development of respect and trust for other members of the health care team.[7] Recommended examples of integrative strategies for learning through IPE include interprofessional course assignments, simulation laboratories, and community projects.[3]

In order to provide new collaborative learning opportunities for students, the University of Rhode Island’s College of Pharmacy and College of Nursing developed an interdisciplinary practice laboratory focused on diabetes care. This program was first offered to students in the spring of 2007. Third-professional-year (P3) pharmacy students participated in the laboratory as part of PHP 516, Integrated Pharmacy Practice Laboratory. Third-year nursing students participated as part of NUR 324, Practicum in Medical-Surgical Nursing. PHP 516 and NUR 324 are required courses for their respective disciplines. Pharmacy students at most colleges and universities are not exposed to interdisciplinary teams until advanced pharmacy practice experiences (APPEs) during the fourth professional (P4) year.[3] This interdisciplinary diabetes practice laboratory at the University of Rhode Island (URI) was the first IPE experience for the majority of the pharmacy and nursing students participating.

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Methods

Four interdisciplinary diabetes laboratory sections were conducted. Both disciplines, nursing and pharmacy, had baseline knowledge of diabetes from previous course experience. Larger enrollment in PHP 516 than NUR 324 resulted in an uneven distribution of students by discipline. As a result one section of the laboratory contained only pharmacy students. The integrated groups contained approximately 6 students each, with a 2:1 ratio of pharmacy to nursing students. Apart from the 2:1 distribution by discipline, selection and assignment of students to individual groups was performed in a random manner by faculty. All participating students were asked to complete a voluntary and anonymous 35-question survey (Table 1) before the lab began and immediately following its completion.

PHP 516 at URI is a requirement for P3 pharmacy students and comprises four lab sections with a maximum of 24 students each. The lab follows a standard format each week. A 30-minute lecture reviewing the pathophysiology, pharmacology, and treatment guidelines of the week's designated topic is presented to the students. Following the presentation small groups made up of 4 to 6 students rotate through several interactive practice stations. While waiting for station availability or upon completion of all the stations, the students remain in groups and collaboratively formulate care plans related to patient case examples/scenarios.

NUR 324 at URI consists of a practicum in caring for the medical-surgical hospitalized patient. The students practice direct care on patient simulators with a focus on the head-to-toe exam, development of nursing diagnoses, and implementation of care plans. A variety of patient care scenarios that simulate future hospital experiences are presented to the students.

The interdisciplinary diabetes practice laboratory conducted in the spring of 2007, consisted of 54 third-year nursing students and 89 third-professional-year pharmacy students. Faculty from both colleges collaborated in order to ensure that the didactic lecture portion of the laboratory would meet the educational needs of both pharmacy and nursing students. Faculty developed a presentation that included pharmaceutical care recommendations and nursing implications to optimize the care of patients with diabetes. A review of the management of hyperglycemia in the acute care setting, including education on the administration of continuous variable intravenous (IV) insulin drip rates, was presented to the students during the didactic portion of the laboratory.

Following the didactic presentation the first four groups of students participated in various interactive learning stations. The four stations demonstrated the use or administration of inhaled insulin, blood glucose meters, insulin pens, and subcutaneous injections. A nursing faculty member, pharmacy practice faculty member, teaching assistant, or P4 pharmacy student (participating in an Advanced Academic Teaching Rotation) moderated each station. After a demonstration provided by the moderator, the students were given an opportunity to practice with the various devices and techniques presented. Students prepared an injection site with alcohol, used aseptic technique to draw up normal saline, and self-administered a subcutaneous injection. Moderating faculty ensured appropriate handling and disposal of needles, lancets, and blood glucose strips. In addition to interactive learning stations, the interdisciplinary student groups collaborated to answer case-based questions related to diabetes management. Students discussed the patient case scenarios and arrived at a group consensus related to recommendations for patient care.

Prior to the laboratory exercise and immediately after its completion the students were given a voluntary survey to complete (Table 1). Data was collected by anonymous survey with no student identifiers. The survey had previously undergone review and approval by the University of Rhode Island's Institutional Review Board.

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Table 1: Nursing and Pharmacy Student Perception Survey

March 31, 2007

Please complete this survey regarding your perception of the current roles of nurses and pharmacists.

The questions are based on a 1-5 scale with 1 being Strongly Disagree (SD) and 5 being Strongly Agree (SA). (NA) for cases where it is Not Applicable

	SD				SA	NA
1. Pharmacists play a role in health care in a hospital setting	1	2	3	4	5	NA
2. Nurses play a role in health care in a hospital setting	1	2	3	4	5	NA
3. Pharmacists play a role in health care in nursing homes	1	2	3	4	5	NA
4. Nurses play a role in health care in nursing homes	1	2	3	4	5	NA
5. Pharmacists play a role in health care in Dr.'s offices	1	2	3	4	5	NA
6. Nurses play a role in health care in Dr.'s offices	1	2	3	4	5	NA
7. Pharmacists play a role in health care in an ambulatory care setting	1	2	3	4	5	NA
8. Nurses play a role in health care in an ambulatory care setting	1	2	3	4	5	NA
9. Pharmacists play a role in health care in a community setting	1	2	3	4	5	NA
10. Nurses play a role in health care in a community setting	1	2	3	4	5	NA
11. You have worked directly with health care providers in other disciplines	1	2	3	4	5	NA
12. If you are a nursing student, you have worked with a pharmacist	1	2	3	4	5	NA
13. If you are a pharmacy student, you have worked with a nurse	1	2	3	4	5	NA
14. Pharmacists play a role on the health care team for diabetes education	1	2	3	4	5	NA
15. Nurses play a role on the health care team for diabetes education	1	2	3	4	5	NA
16. Pharmacists play a role on the health care team for insulin adjustment	1	2	3	4	5	NA
17. Nurses play a role on the health care team for insulin adjustment	1	2	3	4	5	NA
18. Pharmacists play a role on the health care team for insulin pump use/education	1	2	3	4	5	NA
19. Nurses play a role on the health care team for insulin pump use/education	1	2	3	4	5	NA
20. Pharmacists play a role on the health care team for injections	1	2	3	4	5	NA
21. Nurses play a role on the health care team for injections	1	2	3	4	5	NA
22. Pharmacists play a role on the health care team for monitoring and identifying	1	2	3	4	5	NA

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signs and symptoms of hypoglycemia

23. Nurses play a role on the health care team for monitoring and identifying signs and symptoms of hypoglycemia	1	2	3	4	5	NA
24. Pharmacists play a role on the health care team for nutritional management	1	2	3	4	5	NA
25. Nurses play a role on the health care team for nutritional management	1	2	3	4	5	NA
26. Pharmacists play a role on the health care team for sick day management	1	2	3	4	5	NA
27. Nurses play a role on the health care team for sick day management	1	2	3	4	5	NA
28. Pharmacists play a role on the health care team for oral medication management	1	2	3	4	5	NA
29. Nurses play a role on the health care team for oral medication management	1	2	3	4	5	NA
30. Pharmacists play a role on the health care team for exercise	1	2	3	4	5	NA
31. Nurses play a role on the health care team for exercise	1	2	3	4	5	NA
32. You are comfortable when seeking assistance from a nurse	1	2	3	4	5	NA
33. You are comfortable when seeking assistance from a pharmacist	1	2	3	4	5	NA
34. You are comfortable when seeking assistance from a nurse in a patient care setting	1	2	3	4	5	NA
35. You are comfortable when seeking assistance from a pharmacist in a patient care setting	1	2	3	4	5	NA

36. Additional comments regarding the role and interactions of pharmacists and nurses on a health care team.

Statistical Analysis

The questions contained within the survey addressed perceptions of the roles that nurses and pharmacists play in the delivery of health care in a variety of settings. Many of the questions related specifically to diabetes management. The survey also examined the comfort level of each discipline in seeking assistance from the other in the future. The responses to the questions were provided by the students using a 5-point whole-number Likert scale, from 1- strongly disagree up to 5- strongly agree. The hypothesis was that following completion of the interdisciplinary laboratory student survey responses would reflect improved perceptions of: their personal contributions and abilities as a pharmacist or nurse and the contributions and abilities of the other discipline. Two-sample t-tests were used for all comparisons of pre- and post-laboratory survey responses. Data matching in order to conduct paired t-tests or Wilcoxon signed rank tests was not possible as pre- and post-data were not paired by student. This method of data collection was used in order to preserve student confidentiality. The analysis focused on the direct comparison of the survey responses by discipline. Student responses collected prior to the interdisciplinary lab were compared with responses immediately after the laboratory experience. Pharmacy and nursing student responses were analyzed separately using the same methods. An additional comparison was performed to ascertain which discipline reported a more favorable response to each question. The comparison of favorable response by discipline was conducted with both pre- and post-laboratory data. Summary statistics (mean differences with standard deviations) are presented for each comparison. Results marked with an asterisk (*) meet the pre-determined level of statistical significance (*P*-value) of α </= 0.05.

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Results

Statistical analysis of the pre-and-post surveys demonstrated positive changes in pharmacy and nursing student responses related to the perceived ability of the other discipline to provide patient care. The responses also indicated a favorable improvement in comfort level with seeking assistance in various patient care settings from the other discipline. Nursing students demonstrated larger magnitudes of change from the pre-to-post survey responses, with four domains demonstrating a mean difference >1.00*. Neither discipline reported a more favorable pre-laboratory perception of the others' health care skills or roles for any of the questions presented (Table 2).

Table 2: Pre- to Post- Comparison of Pharmacy Students and Nursing Students

Comparing Pre- to Post-	*Nursing Students*				*Pharmacy Students*			
Question	*N*	*Mean Difference (Std. Error)*	*P-value*	*Higher period*	*N*	*Mean Difference (Std. Error)*	*P-value*	*Higher period*
1. Pharmacists play a role in health care in a hospital setting	94	0.075 (0.136)	0.583	Post	126	0.224 (0.126)	0.077	Post
2. Nurses play a role in health care in a hospital setting	94	-0.1 (0.041)	*0.017	Pre	126	0.177 (0.104)	0.092	Post
3. Pharmacists play a role in health care in nursing homes	94	0.546 (0.195)	*0.006	Post	125	0.628 (0.171)	*<0.001	Post
4. Nurses play a role in health care in nursing homes	94	-0.076 (0.065)	0.242	Pre	126	0.203 (0.108)	0.062	Post
5. Pharmacists play a role in health care in Dr.'s offices	93	0.609 (0.212)	*0.005	Post	126	1.015 (0.193)	*<0.001	Post
6. Nurses play a role in health care in Dr.'s offices	94	0.106 (0.149)	0.482	Post	126	0.576 (0.142)	*<0.001	Post
7. Pharmacists play a role in health care in an ambulatory care setting	93	0.633 (0.197)	*0.002	Post	126	0.494 (0.157)	*0.002	Post
8. Nurses play a role in health care in an ambulatory care setting	94	0.001 (0.146)	0.995	Post	126	0.515 (0.133)	*<0.001	Post
9. Pharmacists play a role in health care in a community setting	93	0.286 (0.173)	0.102	Post	126	-0.014 (0.108)	0.900	Pre
10. Nurses play a role in health care in a community setting	94	0.094 (0.138)	0.496	Post	125	1.164 (0.173)	*<0.001	Post
11. You have worked directly with health care providers in other disciplines	87	-0.825 (1.195)	0.492	Pre	124	0.458 (0.185)	*0.015	Post
12. If you are a nursing student, you have worked with a pharmacist	92	1.296 (0.268)	*<0.001	Post	126	0.774 (0.17)	*<0.001	Post
13. Pharmacists play a role on the health care team for diabetes education	94	0.37 (0.179)	*0.042	Post	126	0.198 (0.114)	0.084	Post
14. Nurses play a role on the health care team for diabetes education	94	-0.064 (0.079)	0.419	Pre	126	0.362 (0.127)	*0.005	Post
15. Pharmacists play a role on the health care team for insulin adjustment	94	0.452 (0.172)	*0.01	Post	126	0.341 (0.141)	*0.017	Post
16. Nurses play a role on the health care team for insulin adjustment	94	0.156 (0.141)	0.271	Post	126	0.761 (0.14)	*<0.001	Post

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(Cont Table 2)

17. Pharmacists play a role on the health care team for insulin pump use/education.	92	0.444 (0.204)	*0.032	Post		126	0.591 (0.144)	*<0.001		Post
18. Nurses play a role on the health care team for insulin pump use/education.	94	-0.133 (0.097)	0.173	Pre		125	0.649 (0.125)	*<0.001		Post
19. Pharmacists play a role on the health care team for injections	92	1.117 (0.256)	*<0.001	Post		125	0.828 (0.17)	*<0.001		Post
20. Nurses play a role on the health care team for injections	94	-0.076 (0.071)	0.291	Pre		125	0.326 (0.099)	*0.001		Post
21. Pharmacists play a role on the health care team for monitoring and identifying hypoglycemia	91	1.628 (0.255)	*<0.001	Post		125	0.381 (0.146)	*0.010		Post
22. Nurses play a role on the health care team for monitoring and identifying hypoglycemia	94	-0.132 (0.08)	0.101	Pre		125	0.285 (0.117)	*0.016		Post
23. Pharmacists play a role on the health care team for nutritional management.	93	1.068 (0.241)	*<0.001	Post		125	0.466 (0.157)	*0.004		Post
24. Nurses play a role on the health care team for nutritional management	94	-0.054 (0.116)	0.644	Pre		125	0.502 (0.138)	*<0.001		Post
25. Pharmacists play a role on the health care team for sick day management.	90	0.945 (0.231)	*<0.001	Post		124	0.59 (0.151)	*<0.001		Post
26. Nurses play a role on the health care team for sick day management	91	0.518 (0.178)	*0.005	Post		125	0.609 (0.134)	*<0.001		Post
27. Pharmacists play a role on the health care team for oral med management.	93	0.456 (0.214)	*0.036	Post		125	-0.005 (0.101)	0.963		Pre
28. Nurses play a role on the health care team for oral med management	94	0.144 (0.142	0.316	Post		125	0.627 (0.155)	*<0.001		Post
29. Pharmacists play a role on the health care team for exercise management	91	1.478 (0.255)	*<0.001	Post		125	0.833 (0.18)	*<0.001		Post
30. Nurses play a role on the health care team for exercise	94	0.225 (0.122)	0.068	Post		125	0.61 (0.141)	*<0.001		Post
31. You are comfortable when seeking assistance from a nurse	90	-0.042	0.617	Pre		124	0.623 (0.146)	*<0.001		Post
32. You are comfortable when seeking assistance from a pharmacist	94	0.337 (0.154)	*0.031	Post		109	0.306 (0.191)	0.112		Post
33. You are comfortable when seeking assistance from a nurse in a patient care setting	89	-0.086 (0.073)	0.244	Pre		123	0.48 (0.135)	*0.001		Post
34. You are comfortable when seeking assistance from a pharmacist in a patient care setting	93	0.511 (0.202)	*0.013	Post		108	0.389 (0.2)	0.054		Post
*=Significant difference at the $p<0.05$ level										

Nursing students reported significantly improved perceptions of pharmacists in twelve patient care areas including: monitoring for hypoglycemia [mean pre 2.65, post 4.28; mean difference 1.63*], exercise management [mean pre 2.65, post 4.13; mean difference 1.48*], injection

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technique/counseling [mean pre 2.81, post 3.93; mean difference 1.12*], nutritional management [mean pre 3.13, post 4.20; mean difference 1.07*], and eight other areas. Nursing students also reported that they are more comfortable seeking assistance from a pharmacist in a patient care setting [mean pre 4.19, post 4.70; mean difference 0.51*] after participation in the interdisciplinary laboratory.

Pharmacy students reported improved perceptions of nurses that reached a level of statistical significance in twelve patient care and practice domains. The areas included: playing a role in community health care [mean pre 3.24, post 4.41; mean difference 1.17*], adjusting insulin regimens [mean pre 3.94, post 4.70; mean difference 0.76*], use of and education regarding insulin pumps [mean pre 4.18, post 4.83; mean difference 0.65*], oral medication management [mean pre 4.00, post 4.63; mean difference 0.63*], and eight other areas. Pharmacy students reported greater comfort in seeking assistance from a nurse in the patient care setting [mean pre 4.27, post 4.75; mean difference 0.48*] in the post-laboratory survey.

Nursing students reported lower post-survey responses to one question: "nurses play a role in the hospital setting", which reached the level of statistical significance [mean pre 5.00, post 4.9; mean difference 0.1*]. Pharmacy students reported statistically significant improvements in their perceptions of their own ability to provide patient care in ten areas, including their role in a physician's office [mean pre 3.15, post 4.17; mean difference 1.02*], exercise management [mean pre 3.59, post 4.42; mean difference 0.83*], injection administration/education [mean pre 3.70, post 4.53; mean difference 0.83*], and seven others. Nursing students' perceptions of their own abilities to provide patient care improved in one area, sick day management [mean pre 4.16, post 4.68; mean difference 0.52*].

In addition to the Likert scale questions, students were encouraged to provide anonymous comments and answer open-ended questions about the interdisciplinary laboratory experience. Student comments and opinions were grouped into categories and were predominately positive. Comments illustrated insight into the strengths of each profession and an appreciation of the value of interprofessional practice, including potential benefit for direct patient care. As an example, nursing students frequently cited the pharmacy student's ability to provide medication information, patient education and drug interaction information as important resources. Pharmacy students acknowledged the important impact of the nursing perspective to the delivery of direct patient care, including evaluation of the patient's response to treatment.

Discussion

The importance of interdisciplinary health care teams on the provision of patient care is well recognized.[8,9,10] Teams composed of health care professionals from different disciplines who conduct individual assessments and develop patient care plans independently are not considered interdisciplinary teams.[3] Interprofessional education is an evolving and growing area. A main goal of IPE is fostering interdisciplinary trust and the necessary communication skills for students to effectively participate in interdisciplinary teams as future health care providers. Studies looking at IPE across colleges and universities have found that while interest among college faculty to promote and conduct IPE is high, barriers are often cited as well. In a survey of six colleges of pharmacy in the United States, faculty reported scheduling conflicts, baseline knowledge differences among disciplines, classroom space, ownership of curricula, distribution of tuition, and time to develop IPE courses as concerns.[11]

In our survey results, the perception of nursing students regarding the pharmacists' role in health care changed by a significant magnitude following the interdisciplinary laboratory. The change demonstrated was greater than pharmacy students' perceptions of the role of nurses. This is likely due to the changing role of pharmacists from primarily dispensers of medications to providers of direct patient care including: administering vaccines, counseling patients and caregivers,[12] monitoring therapeutic outcomes, adjusting drug regimens under collaborative practice, performing physical assessment, and providing many other clinical services. It is likely that nursing students were not exposed to clinical pharmacy practice prior to participation in this interdisciplinary laboratory. The

World Health Organization (WHO) asserts the importance of pharmacist counseling related to disease prevention and lifestyle modification.[13] The ACPE standards and guidelines include competencies related to public health and pharmacists as health educators.[6] Pharmacists provide health education to patients and caregivers across a variety of disease states including: diabetes, asthma, anticoagulation, hypertension, hyperlipidemia, and congestive heart failure.[14-19] While nursing students may have experienced pharmacist counseling related to medications, they may have been unaware of the provision of disease state management and wellness promotion by pharmacists.

The role of nurses has also evolved to include a focus on medication-related patient education, evidence-based care, and medication reconciliation during transitions of care.[20] Patient education goals are directed toward facilitating an understanding of disease states including management guidelines, promoting lifestyle changes and other adaptations, and ensuring proper medication administration. The nursing curriculum at the baccalaureate level has evolved to include an increased emphasis on understanding medication indications and mechanisms of action. This understanding of medications allows nurses to provide patient and caregiver education to improve patient safety, reduce medication errors, and enhance adherence to treatment. Pharmacy students' perspectives of nursing roles after completion of the interdisciplinary lab showed the greatest improvements in relation to insulin and oral medication management. This likely reflects a previous lack of awareness of nurses' medication-related knowledge and involvement in providing medication-centered patient counseling.

Care of patients with diabetes is recognized by the IOM as requiring involvement of multidisciplinary care teams due to the potentially long duration of disease and severity of associated complications. The report from the IOM, published in 2001, also suggests that patients with long-term care needs are at great risk of complications and medication errors when a break in continuity of care occurs.[1] For this reason, the care of patients with diabetes and review of related medication therapies was selected as the focus of the pharmacy/nursing interdisciplinary practice laboratory. The purpose of the integrated laboratory was to increase student comfort with interdisciplinary practice in the short term, with the long-range goal of IPE improving patient care and reducing medication errors.[5] These goals and the significant improvement in students' perceptions of interdisciplinary practice have prompted the development of additional IPE opportunities at the University of Rhode Island. A nursing/pharmacy laboratory including physical assessment and medication administration with patient simulators has been developed and implemented. An asthma laboratory including medicine, pharmacy and nursing students is also currently offered during the students' third professional year. Other disciplines considered for inclusion in future IPE opportunities are physical therapy and nutritional science.

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