

REVIEW

Evaluation of Evidence for Interprofessional Education

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Based on recommendations from numerous organizations, educators in healthcare disciplines are implementing interprofessional training programs. Our objective was to summarize relevant literature in a way that would be most useful to clinician educators. Studies involving educational interventions in health professions to enhance learner-based outcomes relevant to the provision of interprofessional care were identified. We sought prospective, controlled trials in which at least 2 health care disciplines were represented, and 1 of which was medicine. Thirteen reports met the criteria for inclusion. Interventions varied widely in design and intensity, but generally included both didactic and clinical components and lasted several weeks or longer. Most studies used pretest/posttest controls and observed positive effects on learners' attitudes and knowledge. Combined clinical and didactic experiences may produce short-term improvements in learners' knowledge and attitudes about interprofessional care. Future research should employ control groups and validated, behaviorally oriented outcome measures whenever possible.

Keywords: interprofessional education, pharmacy education, clinical training

INTRODUCTION

In its report entitled *Crossing the Quality Chasm*, the Institute of Medicine calls for radical realignment of the health care system to enhance its quality, safety, patient-centeredness, timeliness, efficiency, and equity.¹ A subsequent summit of educators of health care professionals concluded that to achieve this vision, all health care professionals should be trained to function in interprofessional teams.² Enhanced education for health professionals in interprofessional care has also been endorsed by leading government and philanthropic organizations in the United States, including the Institute of Medicine³ and the Pew Charitable Foundation.⁴ Consistent with these trends, the American Society of Health-System Pharmacists,⁵ American Association of Colleges of Pharmacy,⁶ American Association of Medical Colleges (AAMC),⁷ and the Accreditation Committee for Graduate Medical Education (ACGME)⁸ recommend training to enhance pharmacists' and physicians' ability to work in interprofessional teams and to communicate effectively with healthcare professionals from other disciplines.

Programs to enhance interprofessional health care education have been in place in the United States for up

to 30 years, and some have included pharmacy. Examples include the Department of Veterans Affairs' Interprofessional Team Training and Development (ITT&D) and Primary Care in Internal Medicine (PRIME) programs,^{3,9} and the Partnerships for Quality Education (PQE) Collaborative Interprofessional Team Education (CITE) programs.¹⁰ In geriatrics, interprofessional education has received particular emphasis, for example, in a 1995 white paper from the Health Resources and Services Administration (HRSA) of the Department of Health and Human Services (DHHS),¹¹ and through training programs including HRSA-sponsored Geriatrics Education Centers,^{3,12} and the John A. Hartford Foundation Geriatrics Interdisciplinary Team Training (GITT) initiative.¹³

Despite endorsement by government, philanthropic, and educational organizations, interprofessional education is limited in most health care curricula in the United States. Experts recommend that such training be integrated into health care curricula in a gradual and graduated fashion, and that educational models including multiple health care disciplines integrate didactic instruction with clinical learning.⁹ However, educators are challenged to integrate interprofessional education into current clinical training environments. Barriers to interprofessional education include differences between disciplines in history and culture, academic schedules, professional identity, accountability and clinical responsibility,

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and expectations of professional education.¹⁴ Barriers pertaining to educational systems also exist,¹⁵ such as availability of interprofessional education and educational content, including understanding professional roles and group skills.¹⁵

Optimal curricula in interprofessional education would be designed to affect learner behavior in clinical settings in ways demonstrated to improve patient outcomes, or to improve processes of care that improve patient outcomes. Evidence is scarce, however, on interprofessional care models most likely to improve patient outcomes or processes of care. One recent federal report examining interprofessional care identified 6 literature reviews examining its effectiveness. The reviews found few well-controlled studies and mixed results. The report concluded “there is . . . evidence, primarily in hospital settings and mainly with older populations, that conscious team approaches to care delivery can result in improvements in a range of outcomes. As a group, however, the studies have a number of serious limitations. . . . As a result, the impact of the overall quality of such efforts on outcomes cannot be assessed.”¹⁶

A recent comprehensive literature review by the Cochrane Effective Practice and Organization of Care Group that sought to summarize results from studies examining the effects of interprofessional education on health care processes or outcomes found no studies of adequate quality for inclusion.¹⁷ In contrast, a commissioned systematic review of interprofessional education produced by many of the same authors applied more liberal criteria and described a large number of studies broadly related to interprofessional education.¹⁸⁻²¹ Many of the studies describe interesting observations and innovative programs in interprofessional education but do not include objective measures and/or control groups, and are therefore of limited or unclear generalizability. A narrower search strategy that excludes descriptive reports, uncontrolled studies, and those with a lack of objective or validated measures could yield a body of evidence that more clearly identifies educational interventions that are useful for interprofessional education.

The objective of this review was to summarize the wide-ranging literature on interprofessional education in a way that would be most useful to clinician educators involved with, or considering, designing interprofessional education programs. Specifically, recognizing that there is currently little evidence that interprofessional education influences health care processes or outcomes,¹⁷ we wished to address the question, what educational interventions for health professions trainees are likely to enhance learner-based outcomes (knowledge, skills, and behavior) relevant to the provision of interprofessional care?

METHODS

Interprofessional care was defined as joint assessment and/or management of patients by health professionals from more than one discipline (eg, medicine, nursing, pharmacy, social work) closely linked in time and space, and is distinct from consultative or multidisciplinary models of care, or those where responsibility for patient care is delegated from one profession (usually a physician) to another (eg, pharmacist, nurse practitioner). Interprofessional education intervention was defined as a planned experience for learners from more than one discipline that includes direct instruction (eg, didactics, seminars, workshops) and/or a clinical experience in interprofessional care. Proficiency was defined as learner attitudes, knowledge, skills, or behavior directly relevant to interprofessional care.

Criteria for Study Inclusion

We sought to include prospective, controlled trials. Other methodologies were excluded as inadequate to quantify effect sizes or to establish causality between measured effects and education interventions applied. All types of educational, training, and teaching models were included. Suitable controls included parallel controls (participants were similar to experimental trainees, but received the “usual” intervention) with or without randomization, or pre-/post- controls (trainees were evaluated before and after the educational intervention). The intervention must have been described in sufficient detail to allow it to be reproduced in other settings, even if additional information, such as details on teaching methods or educational content, might be required.

We included educational models in which at least 2 health care disciplines were represented, 1 of which was medicine. Studies not involving medical learners were excluded because those teams are different from teams with medical learners; this limitation was necessary to keep our research question focused and the sampling of studies more homogenous. In addition, there is a large and growing need to involve physicians in interdisciplinary teams because the current standard model of care is physician-directed. Studies enrolling physicians from more than one specialty but no professionals from other health care disciplines were also excluded. Subjects enrolled in the studies could be health care undergraduate, graduate, or postgraduate students, or practicing clinicians.

Studies were required to report objective measurement of learners’ attitudes, knowledge, skills, or behaviors. Studies that reported only learners’ self-assessed improvements in attitudes, knowledge, skills, or behavior were excluded, since self-assessment is only weakly related to objective measures of performance.²²

Measurement of learner outcomes could be through written or observer-based assessments. Validation of measurement methods was not a requirement.

Search Strategy and Methods of Review

We searched the following electronic databases: PubMed, CINAHL, Psych-Info, ERIC, EMBASE, TRIP, TIMELIT, and Cochrane Collaboration. Initial searches on PubMed were conducted for English-language studies through September 2003 using the terms (interdisciplinary OR interprofessional) AND (education OR training), restricted to human subjects. Searches of the remaining databases were carried out in an iterative fashion in consultation with a reference librarian using terms common among relevant references. Because of ambiguity in terminology used in these types of studies (interprofessional, interdisciplinary, multidisciplinary), we intentionally kept our search strategy broad to avoid exclusion of relevant studies. Reference sections of relevant articles and of previous reviews related to interprofessional education were also searched for potentially relevant studies.

All titles were initially scanned by one reviewer (B.W., T.R., or M.F.). Abstracts from articles whose titles were potentially relevant to the inclusion criteria were reviewed. Full-text manuscripts were obtained for articles that met our inclusion criteria or could not be excluded with the information available. Articles selected for inclusion by the primary reviewer were reviewed by at least 1 other author. All 3 authors reviewed specific articles about which the primary reviewer had questions. Final decisions for inclusion or exclusion were made by consensus.

RESULTS

Our search strategy produced a total of 8,903 titles, many of which were identified in more than one database. Of these, the full-text version of 209 articles was obtained for detailed review. Nineteen articles were identified by at least 1 reviewer as meeting the criteria for inclusion. On inspection by the second reviewer, 6 of these were subsequently excluded, resulting in 13 articles included in the final review (Table 1).²³⁻³⁵ Two studies from the same group employed the same intervention and evaluation methods to medical and social work students, and medical and nursing students, respectively.^{27,28} Two other studies did not report results but were included to provide a more complete description of study designs, interventions, and measurement methods.^{31,34}

The majority of articles not included but related to interprofessional education were conceptual in nature, descriptions of qualitative factors felt relevant to interprofessional education, or descriptions of educational programs without control groups or objective learner-based outcome measures.

The selected studies were published over a period of 24 years and were conducted in inpatient,^{23-25,33,35} rural ambulatory,^{29-31,33,34} residential retirement facility,³² or academic ambulatory²⁶ settings. There was a wide variety of health care disciplines represented in the interprofessional teams of the trials. By definition, medical trainees were involved in all studies. Nursing was represented often,^{23,25,26,28-35} with smaller numbers of trainees from other disciplines, including pharmacy,^{29,33} social work,^{23,26,27,29-32} psychology,²⁶ physical therapy,^{23,29,32,34} occupational therapy,²³ nutrition,^{29,32} dentistry,^{23,32} speech therapy,³² pastoral care,³² health administration,^{23,30,32} public health,³¹ and health education.³⁰ Most of these trainees were health professions students; only 2 trials included practicing clinicians as study subjects.^{26,35}

Duration and intensity of the educational programs and types of learners involved varied widely. While some were discrete experiences,^{27,28,32,35} others were weeks or months long and were set in actual clinical practices.^{23-26,29-31,33,34} Many included didactic educational experiences about participating on teams.^{23,27,28,31,32} Despite most interventions being conducted as part of educational curricula for health professions students, participation in the studies was often voluntary. Most studies employed a pre-test/post-test design to measure and compare their chosen outcomes.²³⁻³⁴ Only 3 trials used a parallel group comparison^{23,30,35} and only 1 of these employed random assignment of teams to an active or control group.³⁵

The interventions chosen for the 13 trials were mainly a combination of didactic instruction with clinical training.^{23-25,30,32,34,35} Two studies from the same research group utilized an intervention consisting of didactic instruction only, including a fictitious case for students to evaluate and report on.^{27,28} Three trials apparently consisted only of clinical interventions.^{26,29,33}

A total of 4 studies used previously developed questionnaires to measure outcomes.^{23,24,29,35} One other study incorporated an existing questionnaire at the end of the reported study.³¹ No study that used previously developed questionnaires described or mentioned the validity or reliability of the instrument based on previous work. Five studies developed their own questionnaires and described some of their features (eg, number of items, response scales).^{25,30,32,33,35} Of these 5, 2 studies reported measurements of survey reliability or validity.^{32,35} The instruments used in the remaining 4 studies^{26,28,34} were not described.

Study results were largely positive (Table 1). Outcomes examined included measures of attitudes, knowledge, and behaviors/skills. Eleven studies examined the effect of their intervention on attitudes of the trainees. The attitudes assessed were those toward other disciplines,^{23,27-29,34} their own discipline,³⁴ health care

Table 1. Prospective, Controlled Studies of Educational Interventions for Enhancing Proficiencies Relevant to Interprofessional Care

Study	Intervention	Results
Mazur et al (1979) ²³	9 weeks clinical training, including 24 hours of didactic instruction on participating on teams Conducted in a long-term rehabilitation facility	Results are reported selectively; some outcomes are reported for individual years of the program, and the parallel control results are not reported ● Trainees demonstrated improvement in two dimensions on the Team Effectiveness Survey ● Attitudes toward other disciplines were variable over the three years of assessment ● 85% of participants said the program met or exceeded their expectations in becoming effective team members ● 60% of preceptors noted improvements in communications, interpersonal relationships and problem-solving following the training ● Scores improved from 75% at baseline to 87% at the end of training (most improvement in the area of attitudes toward aging) ● All students had similar perceptions about the role of the physician at baseline ● Nursing students' perceptions of the role of nurses were considerably higher than medical students' perceptions of their role at baseline ● Medical students' perceptions of the role of nurses improved over the course of the intervention ● Discrepancies between medical students' and nursing students' perceptions of the role of nurses persisted in the areas of interpretation of data and communication about medical conditions ● Overall scores increased from 51 ± 15 at baseline to 75 ± 4 (out of a possible 80 points, p < 0.001) after the miniresidency
Crooks et al (1982) ²⁴	Daily bedside teaching rounds, discipline-specific didactic education curriculum (varying length by discipline)	
Croen et al (1984) ²⁵	Conferences, seminars, rounds for 10 mornings Teams of 3 (1 medical and 2 nursing students) evaluated hospitalized geriatric patients and presented their findings to other students and an interprofessional panel of faculty (medicine, nursing, psychiatry, law, pharmacy, social work)	
Jackson et al (1990) ²⁶	Miniresidency consisting of a 2-week experience with multidisciplinary team-care rounds; sessions in geriatrics, medicine, psychiatry and neurology clinics; social work and occupational therapy sessions; psychometric testing; home visits; and adult day care activities for patients with dementia	
Hewstone et al (1994) ²⁷	One-day workshop. Groups of students evaluated the care of a videotaped patient case; discussed issues related to patient and interprofessional communication	● Trend towards improvement in attitudes toward the other profession. ● Self-assessed knowledge of the other profession improved
Carpenter (1995) ²⁸	One-day workshop. Pairs or small groups of students evaluated the care of a videotaped patient case; discussed issues related to patient and interprofessional communication	● Attitudes towards working with the other profession generally improved; social work students found the experience more useful than medical students ● Attitudes toward other discipline improved ● Respect for other discipline's competence improved ● Knowledge of other discipline's attitudes, skills and roles increased more among the nursing students
Hayward et al (1996) ²⁹	Rotation duration 5-16 weeks depending on discipline; Interprofessional teams in rural settings	● Changes were observed in professional competence and autonomy, and perception of actual cooperation and resource sharing.
LaSala et al (1997) ³⁰	Didactic and clinical experience in interprofessional rural primary health care 15 hours classroom time + 90 hours clinical time over 4 weeks	● Practicum students had more positive attitudes toward interprofessional care than controls at baseline
Burns et al (2000) ³¹	A three-semester series including didactic education in health care issues in underserved areas and interprofessional health care teams, and clinical training in primary care in underserved areas	● Practicum students' attitudes toward interprofessional care improved over time ● No results reported

Barber et al (1997) ³²	Four three-hour didactic sessions on team dynamics, team problem solving, team assessment and team care planning Limited clinical exposure	<ul style="list-style-type: none"> ● Knowledge about interprofessional teams improved after attending the Life Span Forum program (10.7 ± 2.7 v 13.6 ± 3.1, p < 0.001) ● Knowledge about aging improved after attending the program (0.427 ± 0.22 v 0.575 ± 0.21, p < 0.001) ● Attitudes toward interprofessional teams improved after attending the program (1.80 ± 0.43 v 1.70 ± 0.49, p < 0.05)
Leeper et al (2001) ³³	Interprofessional care curriculum in outpatient clinics, hospitals and community sites Duration of involvement 2-8 weeks (depending on discipline)	<ul style="list-style-type: none"> ● Attitudes on working in rural practice were variable across disciplines, but overall, no change was observed ● Improvement in self-assessed clinical competency was seen on 6/8 items, with some differences between disciplines ● Other measures differed by discipline; results for pre- post measurements not reported
McNair et al (2001) ³⁴	2-week rural placements on Interprofessional team; clinical and community activities	<ul style="list-style-type: none"> ● No results reported - interim evaluation (program to continue through 2003)
Doran et al (2002) ³⁵	Team education on quality improvement principles with application to actual populations and processes. Teams developed, implemented, and reported back on QI projects.	<ul style="list-style-type: none"> ● Quality improvement knowledge improved in both groups (no difference between groups) ● Effectiveness of group interactions improved in the active group
	Two half-day workshops with 6 months of follow-up	

teams,^{31,32} interprofessional team training,^{30,33} roles on health care teams,³³ roles of health care disciplines in the care of geriatric patients,²⁵ experience in a rural setting,^{30,33} and aging.²⁴ The dimensions of knowledge assessed included aging,^{24,32} other disciplines' skills and roles,^{27,28} interprofessional care,³⁴ geriatrics,²⁶ and quality improvement methods.³⁵ Behaviors and skills were assessed through observer²³ or self-report,^{31,35} and included communication skills,²³ group interactions,³⁵ team skills,³¹ and problem-solving.³⁵

Studies were too few and too small to allow inferences relating different types or duration of intervention, or learner type, to learner outcomes.

DISCUSSION

From a large body of literature related to interprofessional education in the health professions, we identified only a few studies examining the effects of interprofessional education on learner-based outcomes that included control groups and objective outcome measures. Previous reviews of interprofessional education and/or its effects have been less focused on identifying studies that assess learner-based outcomes^{15,17,18,36} or included a wider range of study design and methods.^{15,18,36} Criteria for studies in this review were chosen to identify studies of most immediate and practical relevance to educators involved in or considering designing interprofessional education activities.

The relative lack of information to guide educators in designing interventions to improve interprofessional education has been recognized. For example, a general review of interprofessional education and teamwork identified medical education system and educational content issues as important to interprofessional education and teamwork, but did not find specific studies identifying effects of educational interventions on learner outcomes.¹⁵ Another review concluded that application of research results outside the cultural conditions and contextual determinants in which they were generated is not recommended because of effects of local socio-political forces, and called for more process-oriented research.³⁶ A recent review concluded that the evidence supporting interprofessional education is in need of more qualitative studies.¹⁸

Implications for Education

Results of this review indicate that interprofessional education is likely to improve learners' short-term knowledge and attitudes, but there is little direct evidence for persistent improvement or behavioral change among learners. Although few studies of methodologically high quality were found, nearly uniformly positive results were seen across the 13 studies, especially with respect to

knowledge and attitudes. Only a few outcome measures were found to be unchanged (attitudes toward other professions,²⁷ attitudes on working in rural practice³³) or variable (attitudes toward working with other professions,²³ role of nurses,²⁵ knowledge of other disciplines' attitudes, skills and roles,²⁸ perceptions of roles³³), and no learner outcome measures were negatively affected by the interventions studied. While some of the findings may be due to lack of sensitivity of measurement instruments or control group selection, the uniformity of the results provides some basis for continued implementation of education directed at skills and behaviors relevant to interprofessional care.

The highly variable features of program design imply that effective training programs for participating in interprofessional teams can be developed for a variety of trainees across a range of clinical settings. This is especially important because pharmacy was represented in only a small number of studies.^{29,33} Although data are too limited to draw definitive conclusions about elements of training programs that might predict or preclude success, 3 features of the programs included in our review may be highlighted for instructors involved in educational interventions for interprofessional care. First, nearly all the educational interventions in the 13 studies included explicit attention to "non-clinical skills," including communication, group, and conflict-resolution skills, as has been recommended by experts.¹⁵ Second, most of the educational interventions employed a combination of didactic and clinical instruction.^{23-25,30-32,34,35} Third, some of the interventions used in these studies were "non-traditional" in that service-learning models^{23,29-31,33,34} or interprofessional problem-based learning strategies^{23,25,28-31,33-35} were employed. Experts have cautioned, however, that carrying out these types of educational programs requires selection of motivated and skilled faculty members or additional faculty training in nontraditional teaching methods.¹⁵

Implications for Research

Research of high methodological quality on outcomes of interprofessional education would be of significant value in planning and implementing curricula in interprofessional care. This is especially true in light of the substantial time, training, and costs associated with interprofessional education and the paucity of clinical evidence for improved outcomes associated with interprofessional care. Two main design issues confronting researchers in interprofessional education are the selection of meaningful control groups and outcome measures. Identifying comparison learners is particularly challenging in interprofessional education and may not be practi-

cal in most clinical and educational settings since the ideal comparison learner would be exposed to the same discipline-specific clinical training during the same period as trainees in interprofessional care, but without explicit training in interprofessional care. Use of reliable, valid methods to measure learner knowledge, attitudes, skills, and behavior is essential to establishing the role of interprofessional education in health professions' education. Sixty-six assessment instruments designed to measure team performance have been reviewed elsewhere and may be useful in measuring outcomes of educational interventions.³⁷ There was a trend toward improved measurement methods over time among the studies reviewed. Studies published after 1995 emphasized assessment of knowledge, attitudes, skills, and behavior relevant to functioning on interprofessional teams, contrasting the emphasis on measuring attitudes toward and knowledge of geriatrics and roles of different disciplines from earlier studies. Fortunately, recent progress has been made in developing reliable, valid, outcome measures in interprofessional education.³⁷

Study Limitations

The main limitation of our study is that some studies may not have been identified due to the diverse literature and terminology related to interprofessional care. It is unlikely, however, that key studies of high methodological rigor that could potentially affect the overall conclusions of our review were overlooked. Limiting our review to studies involving medical learners may have restricted the external validity of the study somewhat in that conclusions drawn from this body of evidence may not be extrapolated to interprofessional teams without medical learners.

CONCLUSION

Overall, there is little evidence from controlled trials related to interprofessional teams to guide rapidly changing educational models and clinical practice. Programs that incorporate clinical training combined with explicit training on the processes of interprofessional care can produce changes in attitudes, knowledge, skills, and behaviors of clinicians. It is too early to discern elements of training programs that appear to be particularly successful. Future research in this area should consist of prospective, controlled trials with objective measurement of outcomes related to short- and long-term learner behaviors, processes of care, and patient-based outcomes.

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