

See It – Do It – Learn It: Learning Interprofessional Collaboration in the Clinical Context

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Abstract

Background: The primary goal of the Interprofessional Education in Geriatric Care (IEGC) project was to design, deliver, and evaluate interprofessional (IP) clinical placements for pre-licensure learners in geriatric day hospitals.

Methods: Project evaluation was guided by the modified Kirkpatrick's Model of Educational Outcomes. Using a controlled before-after design, the Attitudes Toward Health Care Teams Scale (ATHCTS), Team Skills Scale (TSS), and Knowledge Questionnaire were administered to intervention and control learners pre-, post-, and 6 months post clinical placements. Quantitative data were analyzed using descriptive and multivariate statistics. Qualitative data collected through journals and questionnaires were analyzed using content analysis.

Findings: Eleven IP clinical placements occurred at 3 test sites involving 32 intervention and 11 control learner participants. There was no significant change, over time, in the ATHCTS quality of care and physician centrality scores for the combined group (i.e., intervention and control) and between intervention and control groups. Time effects were noted in the quality of care scores for the intervention group after controlling for prior IPE ($p = .031$). The Knowledge scores were higher for the intervention group compared with controls over time ($p = .004$). Both intervention and control groups demonstrated significant improvements in their TSS scores over time ($p = .000$), although there was no significant difference in the magnitude of the change between groups ($p = .112$). Themes observed through qualitative analysis of learners' journals and post-program reflective questionnaires supported the quantitative findings.

Conclusions: The IEGC experience was valuable to senior pre-licensure learners in helping them understand collaborative patient-centred practice and team skills. Future research should strive for larger sample sizes through multi-site projects to allow for comparisons within and between clinical sites.

Keywords: Interprofessional; Clinical placements; Education; Team; Patient-centred care

Introduction

In 2003, the First Ministers' Accord set in motion an action plan for Canadian health system renewal. Interprofessional education (IPE) was identified as one way to address emerging health and human resource issues and to ensure that health providers have the knowledge, skills, and attitudes to practice as a team [1]. The Romanow Report emphasized that for health care providers to work collaboratively, the education and training they receive should prepare them to work together and to share their expertise [2]. In September 2004, Health Canada announced a call for

proposals to support the development and implementation of Interprofessional Education for Collaborative Patient-Centred Practice (IECPCP).

The concept of IPE is not new, beginning in the United Kingdom during the 1960s [3]. In North America, IPE programs have developed over the last two decades. The Hartford Foundation-funded Geriatric Interdisciplinary Team Training (GITT) [4-10] and Geriatric Education Centres (GEC) funded through the U.S. Bureau of Health Professions [11] created effective geriatric IPE initiatives throughout the United States. In 2005, Health Canada funded 20 projects across the country, which provided the stimulus for the development of IECPCP initiatives in Canada. The Interprofessional Education in Geriatric Care (IEGC) project was one of the 20 successfully funded initiatives.

Despite a growing body of IPE literature, there have been few rigorous evaluations of the benefit of IECPCP. In a review of 107 high-quality studies published in the area of IPE between 1974 and 2003, Barr et al. noted that 79% of the studies targeted post-qualification health professions using didactic teaching strategies such as workshops [12]. Very few of these studies used mixed methods, and there was a noted lack of methodological rigor. In contrast, a subsequent “best evidence” systematic review [13] noted that 72% of the “high quality” studies published between 1981 and 2005 involved pre-licensure health professional learners. Of these, seven studies examined the impact of IPE within clinical environments. Hammick and colleagues [13] noted the need for more evaluations in practice settings to identify mechanisms that lead to positive attitude and behaviour change.

The concept of interprofessional (IP) clinical placements as a form of practice-based education for pre-licensure learners from health and social care professional programs holds tremendous promise. The IRP^{bc} (Interprofessional Rural Program of British Columbia) – a Canadian IPE program – engages pre-licensure learners in clinical placements in rural settings, emphasizing interprofessional learning through weekly projects, meetings, and shadowing [14,15]. The IRP^{bc} study [14,15] reported positive results, but these findings were based solely on qualitative methods. The present IEGC study was conducted to address the paucity of rigorous mixed-method research as it relates specifically to the impact of IP clinical placements in geriatric settings on senior pre-licensure learners’ attitudes, knowledge, skills, and perceived behaviours.

Project Goal and Research Question

The goal of the IEGC project was to develop, implement, and evaluate interprofessional (IP) clinical placements¹ for senior pre-licensure learners² from 5 health professional programs (medicine, nursing, occupational therapy, pharmacy, physical therapy). This report presents the evaluation and exploration of the impact of the IEGC program on senior pre-licensure learners. Guided by the Joint Evaluation Team’s (JET) modified Kirkpatrick’s Model of Educational Outcomes [16], the project sought to measure four of the six educational outcomes (reaction, changes in knowledge and skills, changes in attitudes/perceptions, and self-reported behaviour) using a mixed-methods design. Specifically, the research question for this

IEGC study was: For senior pre-licensure learners, does participation in an IP clinical placement occurring at a geriatric day hospital improve knowledge, attitudes, perceptions, and skills in collaborative patient-centred practice (CPCP) when compared with a matched control group?

Methods

Prior to the implementation of any study activities, this study received the approval of the University of Manitoba Ethics Board as well as the appropriate institutional access/ethics review committees.

Project setting and context

The IEGC project occurred in geriatric day hospitals (GDH). The GDH teams provide interprofessional outpatient assessment and rehabilitation for frail older adults. To be eligible for day hospital services, older adults referred to the program must need the services of two or more health professions. Collaborative patient-centred care is the standard of practice, and team members set team goals and review progress for individual patients. The GDHs have traditionally offered clinical placements for senior pre-licensure learners, but they have not deliberately brought learners into the setting at the same time or taught collaborative patient-centred practice explicitly.

Study sample and recruitment procedures

The IEGC educational experience was offered within pre-existing GDH clinical placements when senior pre-licensure learners from at least two of five participating professions (medicine, nursing, occupational therapy, pharmacy, and physical therapy) were available to participate. These learners who received the IEGC educational experience formed our intervention group. The control group consisted of senior pre-licensure learners who participated in their usual uni-professional clinical placements (direct patient care, mentorship). These senior pre-licensure learners did not receive any education regarding collaboration from the IEGC project. Variations existed in the procedures used by each faculty/school to assign learners (intervention and control) to their clinical placements. Procedures by faculty/school are outlined in Table 1.

IEGC educational intervention for pre-licensure learners

The IEGC educational learning experiences were grounded in and guided by experiential and adult learning theories. These theories present strategies for achieving optimal educational outcomes for adults. Knowles [17] presents seven principles of adult learning, which include elements of learner-driven education and self assessment and opportunities for immediate application within a safe learning environment that allows for integration of prior experiences and knowledge. Kolb [18] presents experiential learning as a four-stage process whereby learners engage in a concrete experience, reflective observation, conceptualization, and active experimentation (p. 40). IEGC educational modules also used contextualized learning the-

Table 1

**IEGC prelicensure learner participants
characteristics & recruitment strategies**

Health Profession	Learning context	Recruitment strategy for test learners	Matched Control Participants
Nursing	4th year learners in final year of Bachelors program Registered in their final clinical practicum course.	Nursing learners interested in the IEGC project embedded the 4 week practicum within their 12 week clinical practicum.	Learners interested in the IEGC learning experience, but excluded due to a limited number of placements.
Pharmacy		Learners indicated their preferred practicum location and the Academic Fieldwork Coordinator subsequently determined placement assignment.	Matched controls were randomly selected from the list of learners who were assigned to a non-IEGC clinical site at the time of the IEGC offering.
Physical Therapy	3rd year learners in final year of Bachelors program registered in the 3rd year Clinical Education in Neurological disorders course.		
Occupational Therapy	Learners at the end of 1st year or middle of 2nd year in the 2-year Masters program registered in a required fieldwork course.		
Medical Residents	Medical Residents (family and/or internal medicine) completing a geriatric medicine rotation.	Residents assigned to the geriatrics rotation during times when the IEGC experience was offered were invited to participate.	Residents assigned to a geriatric rotation at either the control site or at the test site at the time the IEGC experience identified as control subjects were assigned was offered.

ory, which is built on the tenets of actively engaging the learner in the learning process, combining content and context, and using authentic materials [19]. The IEGC project intentionally built a variety of educational activities centred on the key elements of each theory, as outlined below.

Students were present in team meetings and care planning sessions, and they used a “team observation scale” [9] to facilitate their observation of teaming behaviours. They were expected to conduct uni-professional assessments as they participated as an interprofessional team of practicing clinicians under the mentorship of licensed clinicians. They were also provided with opportunities for feedback and self-reflection on clinical and collaborative competencies.

Fifteen hours of IPE-specific experiences were embedded within the traditional profession-specific clinical placements. Specific features of the IEGC educational program [20] included

- icebreaker and wind-up activities that emphasized the importance of social connection between team members;
- self-reflection exercises specific to the activities conducted and the competencies taught;
- learner opportunities to each see the same patient and then collaboratively develop and implement shared care plans for day hospital patients; and
- a concisely tailored reading package and facilitated small group discussions targeting seven core competencies (disciplinary articulation, communication, conflict management, flexibility, leadership,

team dynamics, and goal-setting) [21]. The reading package, created specifically for students, provided a description of each competency as it relates to interprofessional teaming. A copy of this document is available as a PDF at <http://www.cihc.ca/library>.

The researchers collected information from intervention participants (pre-licensure learners and clinicians) after each iteration of the educational experience in order to continually refine the program, thus meeting the stated needs of pre-licensure learners and clinical team mentors.

Validation of the educational content and research process

Recognizing the need to include the senior pre-licensure learners' and patients' perspectives in the development and implementation of this initiative, the researchers conducted a validation meeting with purposefully selected learner representatives from the participating faculties (e.g., chief medical residents, senior sticks, or student council representatives) and conducted key informant interviews with patients. Findings from these activities were used to inform program development.

Data collection and analysis

The IEGC study implemented a parallel mixed-method design in which quantitative and qualitative data were collected and analyzed simultaneously to answer the overarching research question [22]. The mixed methods approach is advocated by researchers stating that "since most interprofessional education initiatives are multi-faceted, more mixed methods studies would be advantageous" [16, p. 55]. One recognized benefit of mixed-method design is the concept of complementarity in that the data from one method clarifies or illustrates the results from the other method [22].

Quantitative data collection and analysis

Validated instruments

Participants' attitudes, perceived skills, and behaviours related to teaming in health care and team skills were assessed using the Geriatric Interdisciplinary Team Training (GITT) entry and exit questionnaires [10]. These questionnaires are a combination of both the Attitudes Toward Health Care Teams Scale (ATHCTS) [7] and the Team Skills Scale (TSS) [23] as well as five questions specific to recruitment and retention of students in geriatric settings. The ATHCTS includes a 14-item Quality of Care and a 7-item Physician Centrality subscale using a 6-point Likert scale. For the Quality of Care subscale, a higher score indicates more positive attitudes toward teaming. For the Physician Centrality subscale, a lower score indicates a more positive attitude toward teams, assuming shared decision-making. Previous research conducted in geriatric settings has shown the ATHCTS to be a reliable and valid measure of individual attitudes and perceived behaviours toward teaming and has been used extensively by various GITT programs [7,10]. The TSS is a self-reported,

17-item, 5-point Likert-type scale with values ranging from 1, “poor,” to 5, “excellent”; summing the 17 items results in a score between 17 and 85. High scores reflect more positive perceptions of teaming skills. The TSS was designed to measure three factors: interpersonal skills, discipline-specific skills, and geriatric care skills. Preliminary psychometric testing suggests the TSS has good reliability [23,24].

Knowledge

The IEGC Knowledge Questionnaire was created specifically for the IEGC project to assess if participants’ knowledge regarding seven identified core competencies changed as a result of the IEGC educational interventions.

The ATHCTS, TSS, and IEGC Knowledge Questionnaire were administered pre-, post-, and 6 months post-IEGC experience/traditional clinical placement. Pre- and post-data were collected from intervention subjects during the IEGC orientation and wind-up sessions. Controls completed the same instruments individually under the supervision of the research technician. The 6-month post-survey was conducted by mail with a request to return the surveys to the IEGC office via a self-addressed, postage paid envelope. Upon receipt of all research surveys, participants received an honorarium.

Data analysis

The sample size calculation for the quantitative aspect of this study was based on a before/after and test/control comparison involving a 1:1 matched-learner sample (matched by discipline and clinical placement time) and on the findings of one study where the ATHCTS was administered to health professionals [7]. The mean score for the 14-item Quality of Care/Process subscale administered to social workers was 57.5 ± 8.2 . Assuming 80% power, an $\alpha = .05$, and a 10% change as significant, the required sample size was $N = 40$ learners per group (test and control). Our target over the 2 years of project implementation was 60 test learners with 60 matched controls.

Quantitative data were entered into the Statistical Package for Social Sciences (SPSS) software [25]. Data analysis included descriptive, bivariate, and repeated measures ANOVA (mixed modeling) procedures. We used a mixed modeling procedure to allow for matching and comparisons across cohorts (test/control) and time (before/after). Covariates that were thought to influence the study subjects’ choice to participate (previous exposure to interprofessional training, age, and gender) were documented and included in the analyses.

Qualitative data collection and analysis

Qualitative data were collected in an effort to garner deeper insight regarding intervention participants’ experiences in the IEGC project. Field notes, open-ended responses, and journal entries were analyzed using general content analysis techniques – specifically thematic coding – to identify general categories or themes [22]. Coding the information into themes provided the opportunity for researchers to understand the scope of the information. Data analysis was a descriptive and interpretive process consisting of 5 steps, which are outlined in Table 2.

Table 2
Qualitative data analysis methods

Step	Description of analysis activity
1.	Data were organized and prepared for analysis, which included verbatim transcription of interviews, and typing the researcher's field notes. Tables were created containing participant responses to the research questions and information from field notes.
2.	Generating the table in step 1 allowed identification of each respondent's perspective in relation to the questions posed and facilitated comparisons for identification of consistent and distinct views.
3.	Data was analyzed separately, identifying potential themes by reading and re-reading the verbatim transcriptions; taking note of commonalities and discrepant information. This iterative process helped the researchers develop the key themes.
4.	The researchers further developed and refined the descriptions and themes identified, by using the tables generated in step one. Verbatim narrative sections were identified and selected to support, exemplify or clarify the themes reported in the findings.
5.	The researchers compared and contrasted key themes within data collection activities.

Learner journals

Intervention participants were asked to complete a standardized journal throughout their participation in the IEGC block. The journals were used to collect information on days that the senior pre-licensure learners had interprofessional education on a variety of topics (nature of the interaction, types of teamwork, questions regarding leadership roles, and conflict resolution), and they created an opportunity for the learners to provide other comments regarding their experiences in the IEGC project.

Self-reflective questionnaires

Self-reflective questionnaires were developed by the IEGC research team to assess intervention participants' reactions, feelings, and perceived behaviours surrounding interprofessional teaming and their IEGC experience. The self-reflective questionnaire was administered only to intervention subjects immediately post- and 6 months post-IEGC experience.

Results

The IEGC project team successfully ran eleven interprofessional clinical experiences (four at sites A & C and three at site B) between January 2006 and March 2008. There were 32 intervention learner participants (nine pharmacy, seven nursing, seven medicine, six physical therapy, and three occupational therapy) and 11 control learner participants. Demographic data from the 26 intervention and 11 control learner participants who completed all three surveys (pre-, post-, and 6 months post-intervention) are presented in Table 3. The mean age of intervention learners was significantly higher than controls. There were no differences between the groups in other parameters measured (gender, discipline, prior IPE).

Table 3

Demographic data on senior pre-licensure learner participants

	Test	Control	p value
	26	11	
Age			0.003
Mean (SD)	28.4 (6.2)	25.9 (2.7)	
Gender			0.114
Male	9	1	
Female	17	10	
Discipline			0.837
Pharmacy	8	4	
Nursing	6	2	
Medicine	5	1	
Occupational therapy	2	2	
Physical therapy	5	2	
Prior IPE			0.457
Yes	12	6	
No	14	5	
Site			
A	11		
B	5		
C	5		
Control		10	
Missing data	5	1	

Reaction

When asked for feedback on the IEGC project, a large proportion of the participants (90%) felt that the program was a valuable experience, as summed up by participants who stated that

it was a good project to be a part of because we will all need to work on a team in our careers in the future,

and that

it was a good experience combining education with clinical experience.

Over three-quarters of the pre-licensure learners (80%) indicated that they would recommend the IEGC educational program to others, stating “*I would love to be able to make more people aware of the benefits of collaboration.*” The positive reaction to the IEGC project was sustained, with approximately 76% of pre-licensure learners stating at the 6-month follow-up point that they would participate in the IEGC project again and less than 10% indicating that they would not participate in the IEGC project again.

Specific information was solicited from participants regarding the workload required by IEGC participants. Most participants felt that the workload required for participation was appropriate for the learning experience, as expressed by one participant who stated:

I don't think the workload was excessive. It was achievable in the rotation/block time without a lot of conflict/or time issues.

One of the open-ended questions on the summative evaluation survey asked participants for any other comments or thoughts they had regarding the IEGC project. Many participants provided additional perspectives on the education program. Two key themes were identified: i) the value of training for all professions and ii) the need for training in other clinical settings. Participants emphasized the value of the educational content, as illustrated by the following quote:

I LOVED IT (the project)! I think all health care students should do this; it really gives a sense of interdisciplinary importance...[and] overall I think this was a great effort. I hope to see this sort of training in all medical science facilities as it will allow for better (patient) care in all areas and will increase respect/knowledge between professionals.

Table 4
**Repeated measures ANOVA of the ATHCTS, TSS
and knowledge test scores**

	Pre-IEGC experience	Post-IEGC experience	6 months post	<i>P</i> value time effects	<i>P</i> value time x group effects	<i>P</i> value average x group
ATHCTS	Mean (SE)	Mean (SE)	Mean (SE)			
Quality of care				0.556	0.507	0.117
Intervention (<i>N</i> =21)	63.6 (1.6)	66.4 (1.9)	64.3 (2.1)			
Control (<i>N</i> =10)	61.0 (2.3)	60.4 (2.7)	59.3 (3.0)			
Physician centrality				0.335	0.465	0.315
Intervention (<i>N</i> =21)	9.2 (1.0)	9.4 (1.0)	9.3 (0.8)			
Control (<i>N</i> =10)	9.8 (1.4)	11.0 (1.5)	11.6 (1.2)			
TSS	Mean (SE) 95% CI	Mean (SE) 95% CI	Mean (SE) 95% CI	0.000	0.112	0.000
Intervention (<i>N</i> =20)	48.8 (2.3) (44.1-53.4)	59.0 (2.0) (54.8-63.2)	57.9 (1.9) (54.0-61.8)			
Control (<i>N</i> =10)	39.1 (3.2) (32.6-45.6)	42.4 (2.9) (36.5-48.3)	43.6 (2.7) (38.0-49.2)			
KNOWLEDGE				0.002	0.004	0.024
Intervention (<i>N</i> =20)	23.0 (0.6)	26.2 (0.7)	26.1 (0.6)			
Control (<i>N</i> =10)	22.8 (0.9)	23.2 (1.0)	22.6 (0.8)			

Attitudes and perceptions

Table 4 outlines the results of the repeated measures ANOVA (mixed modeling procedure). There was no significant difference in the time effects (i.e., no change in the ATHCTS quality of care subscale score over the course of the intervention and extending to 6 months) for the combined intervention and control group. There was also no significant difference in the change in the ATHCTS quality of care subscale score over time ($p = .507$) or in the average scores ($p = .117$) between intervention and control study participants. These change patterns over time and average scores remained insignificant between groups after controlling for age and gender. However, scores in the intervention group increased significantly over time compared with the control group after controlling for prior IPE ($p = .031$). Specifically, intervention learners reporting prior IPE experience on entry to the project demonstrated a greater gain in the ATHCTS quality of care subscale over time compared with control learners reporting prior IPE experience.

There was no significant difference in the time effects in the ATHCTS physician centrality subscale for the combined group ($p = .335$). There was also no difference in the change in scores over time ($p = .465$) or in the average scores ($p = .315$) between intervention and control study participants. Differences remained insignificant after controlling for age, gender, and prior IPE.

Although there were no questions in the journaling or self-reflective questionnaires that pertained specifically to attitude change, several participants offered information that demonstrated awareness of attitudes and perceptions – both their own and perceived attitudes of other health care providers/teams. Key categories included: i) physician centrality, ii) awareness of barriers, and iii) institutional culture. Some participants felt that physicians had an additional obligation that might preclude them from participating as a team member:

Physicians bear legal responsibility to patients currently and may need to act on own to ensure legal position is safe at time.

Other participants were keenly aware that the clinical situation at the geriatric day hospitals may not be reflective of all health care programs, as illustrated by one participant who stated that

interprofessional teaming is relatively new. Many professionals may not be as open to the idea,” and “those more ‘traditional’ health care facilities may not appreciate the value of team-based health care.

Knowledge and skills

The Knowledge score showed significant time effects for the combined group ($p = .002$) as well as significant differences in the change of scores over time ($p = .004$) and in the average scores ($p = .024$) between groups.

Although both intervention and control groups demonstrated a significant improvement in their TSS score over time ($p = .000$), there was no significant difference in the magnitude of the change between intervention and control subjects ($p = .112$). These insignificant group effects persisted after controlling for age, gen-

der, and prior IPE. However, the baseline and average TSS scores were significantly higher in the intervention versus control group ($p = .000$).

Upon entering the IEGC project, pre-licensure learners were asked, “what prompted you to participate in the IEGC experience” and “what do you hope to obtain from this IEGC experience?” Most participants identified skills and abilities that they hoped to achieve, with the majority of learners hoping to acquire specific skills and knowledge in addition to personal and professional development. Participants consistently indicated that they would like to acquire skills that would allow them to become, or be, better team members. Participants hoped that they would learn more about professional roles and scopes of practice – both their own and of other professions. Learners indicated that they hoped to have opportunities to become self-aware – specifically examining their ability to work as a team member – with opportunities to reflect on their individual teaming behaviours. Learners also identified professional development as an item they hoped to learn more about, with an emphasis on communication and leadership skills.

Immediately following the IEGC program, the senior pre-licensure learners were asked, “do you feel this program had an impact on your skills and knowledge level? If so, please describe the changes you’ve experienced.” Responses can be encapsulated into four themes: i) greater awareness of teams and team theory, ii) greater awareness of others roles, iii) increased knowledge about the value of interprofessional collaboration, and iv) skill development.

Many participants indicated that they were more aware of team dynamics and principles of team formation as a result of their participation in the program. Some participants suggested that they are more cognizant of observing other teams for effective team functioning as a result of the study:

I am more aware of the team at the day hospital and it has ++ enriched my time there. I am aware of more things to observe and am therefore picking up on a lot more. Since being involved in group work or in observing groups – outside of this setting – I have been consciously trying to observe effective teaming methods.

Almost all respondents indicated that they had developed a better understanding of professional roles – both their own and others – including scopes of practice and the concepts of flexibility:

I’ve gained an appreciation of what other disciplines can offer, and I feel my knowledge has increased because of this experience.

Learners were almost unanimous in acknowledging the skills they had developed as a result of their participation in the program. Most participants identified leadership and communication as the two skills they either learned the most about, or in which they increased their skills:

I feel that I am better prepared to work in a team setting, more so to “step up” as a leader if needed.

Some learners did not feel that their knowledge and skills greatly improved as a result of the IEGC program. This appears to stem from previous knowledge or prior experience:

Due to spending a large amount of time learning group process in school, this provided more of a review – the opportunity to understand how other professions view team work.

Skills already generally in place from prior work/team experience.
Unclear if applying “terms” for these skills is actually helpful.

Consistent with the quantitative findings, information collected from participants during the six-month follow-up evaluation indicated that these pre-licensure learners had retained the knowledge acquired. When asked, “in general, over the last six months, what impact has the IEGC experience had on your professional activities,” most participants indicated that they felt they had better communication abilities and styles as result of their participation, that they were better leaders when appropriate, and that they had greater flexibility in their clinical roles.

Behaviour (self-reported)

In the post-program evaluation survey, participants were asked about the likelihood that they would use the IEGC educational content in their future practice. Over 80% of the learners indicated they would use the content. One participant stated that the experience was

Very good! Worthwhile experiences that will be a benefit in my future practice.

Within the post-program and six-month follow-up questionnaires, participants were asked to reflect on any impact the IEGC program had on their professional practices. At the post-program evaluation, most participants in clinical practice indicated that they were keen to implement the skills and abilities they had developed during the IEGC program but noted that certain situations, such as solo practice or less hospitable clinical environments, might preclude them from using the skills.

Depends whether or not you are working individually or not. If I am working with others, I will definitely utilize some or all of the skills learned here.

In more rigid, structured environment, it may be difficult to bring the team approach into play, i.e., more traditional areas where paternalistic-style practice is in place.

When asked at the six-month follow-up about their actual professional practices and what impact the IEGC program had, participants indicated that the program had a lasting impact on their professional practices. The most lasting changes reported included: i) increased likelihood of communication with other professions and ii) more effective communication skills. Many learners indicated that they were more likely to communicate with other clinicians to seek advice, problem-solve, and brainstorm solutions, which they attributed to the IEGC program. Additionally,

these participants felt that they had more effective communication skills as a result of the program, stating

[This project] made me a better communicator; I am discussing more in rounds.

Not all participants felt that the IEGC program had an impact on their professional practices; two participants indicated

... no clear impact or change in my pattern of practice. This is not to say that I don't already use the skills ...

while another indicated that

I am currently working in community [practice], so does not have a direct impact on my current work, but I think about ways to incorporate team work between professions and how to integrate them to community [practice].

Discussion

To the investigators' knowledge, this is the first published mixed-methods study looking at the impact of interprofessional clinical placements in the geriatric setting on senior pre-licensure learners' attitudes, knowledge, skills, and perceived behaviours. Study results suggest that the IEGC intervention led to improved knowledge about the seven collaborative competencies taught through the IEGC intervention. The results also suggest that this improved knowledge was sustained at 6 months post-program. Qualitative themes identified in learners' journals and post-program reflective questionnaires indicated an increase in knowledge around four of the competencies taught in the IEGC program: leadership, communication, team dynamics, and disciplinary articulation; this knowledge was reportedly incorporated into professional practice by participants. This significant and sustained increase in knowledge may be due in part to the use of contextual learning processes as a framework for the IEGC educational experience. Caine and Caine indicated that learning is enhanced and retention of information is maximized when learners are provided with opportunities to learn in participatory ways with concrete models and experiences [19]. Furthermore, contextual learning is most effective when learners have the opportunity to learn through personal interaction with other learners – role playing, team learning, and study groups. The IEGC project, through an iterative design process, worked to develop an educational program that was reflective of clinical practice in geriatric day hospitals while promoting social opportunities for learners and clinicians. Dalton et al., in their development and implementation of the Interdisciplinary Rural Placement Program, also noted that interdisciplinary education is best achieved through an experiential framework [26].

Although the intervention did not lead to increases in the ATHCTS Quality of Care (QoC) subscale score between test and control learners, significantly higher scores were noted for the intervention group after controlling for prior IPE, and these scores were sustained at 6 months. This finding suggests that the IEGC inter-

vention had a cumulative effect/benefit on learning, and it underscores the notion that short “doses” of an intervention might be inadequate to modify attitudes. The qualitative data also support the observed benefits of reinforcing and enriching previous knowledge around teamwork. Learners reported the IEGC program was a good opportunity for them to i) see the concepts in clinical context and/or ii) to acquire additional detail or terminology to understand team concepts. On the other hand, not all learners felt that multiple contacts with the information was beneficial; some learners felt that the education would have been better suited to an earlier level learner, as they were already experienced in teamwork. These data begin to inform the issues raised by Clark et al. [11] and Coogle [27] around IPE including the need to address the varying levels of learners, questions around the learning “dose” necessary to accomplish collaborative skills, and the need for a “continuum of teamwork training” to address the varying needs within and across pre- and post-licensure learners from different health care professions.

The lack of impact of the intervention on the ATHCTS Physician Centrality score was consistent with our qualitative analysis that identified the physician as the “leader” of the team, predominantly as a result of perceived legal responsibilities and fears of liability. This is not surprising given that Heinemann et al. [7] noted that this dimension would be unlikely to change unless explicitly taught. Although leadership was one of the core competencies taught within the IEGC modules, issues of individual or team liability were not discussed. The concerns around liability appear to be more of a perceived than a real barrier. Prada et al. [28] conducted an extensive review of the literature relevant to malpractice compensation systems, an analysis of court cases involving negligence in health care, and consultations with key stakeholders and noted that although collaborative patient-centered practice has legal risks, these risks can be minimized through various strategies.

The IEGC study findings were comparable to those of Nisbet et al. [29] who evaluated reaction and changes in attitudes of senior-year learners from various professions participating “in shared, structured learning experiences centred on IP teamwork” during their clinical placements. Using a non-controlled mixed-methods design, these authors observed positive reactions from learners, most notably in terms of improved knowledge around the roles of other health care professions. Also similar to our study, but using semi-structured interviews, Nisbet et al. [29] found limited changes in attitudes.

The Geriatric Interdisciplinary Team Training (GITT) program – offered through eight sites and involving an evaluation of 537 graduate-level learners – was similar to our study in that it was an evaluation of interprofessional training in geriatric settings and that investigators used the ATHCTS and TSS as two of several measures [30]. Although the GITT study reported modest-but-significant improvement in the ATHCTS and significant improvements in TSS across all three participating professions (medicine, nursing, social work), the lack of a control group in that study weakens the ability to link these changes directly to the educational intervention. IEGC study results showed a significant increase in TSS scores in both test and control learners, suggesting a possible benefit of learner involve-

ment in any clinical placement, even if teaming is not explicitly taught. There were several other important differences between the two studies that limit cross comparisons. Student learners from the GITT project were graduate level (40% medical residents; 17% advanced practice nursing students; 12% Master's in social work; and 31% other allied health professions). Moreover, the intervention in the GITT program was not standardized across sites, was of variable duration (4–32 weeks, depending on the site), and involved both didactic (5–144 hours, depending on the site/discipline) and practice (4–32 weeks, depending on the site/discipline) education strategies.

The IEGC study was a small research study couched within a larger demonstration project. Unfortunately, investigators were not able to recruit sufficient numbers of pre-licensure learners to meet the power calculation sample size, thus subjecting our data to Type II error (i.e., false negative results). Due to the small sample size, the investigators were also unable to control for various other potential confounders such as health profession, clinical practice site, and previous degrees. Other researchers have found professional differences in attitudes toward teaming, usually in medical learners, but this study lacked sufficient sample size to determine trends and report differences between professions [30].

The day hospital clinicians were an integral part of the IEGC experience. In addition to providing profession-specific mentorship and training, the clinicians played a key role in the delivery of educational components by leading discussion groups and facilitating care planning sessions. The investigators noted marked differences between the clinical sites, with data collected from learners at each site also indicating that clinical team factors (either positive or negative) had an impact on evaluations of the education and the experience. A larger sample size would have allowed investigators to conduct between-site comparisons to explore these differences.

This study was also limited in that it was not a randomized controlled study. Although the intervention did not lead to a greater increase in TSS score in the test group over controls, it is important to note that the average TSS score was significantly higher in the test than in the control learners. The test group also had a greater mean age than the control group. These findings may substantiate a potential participant selection bias. Participants for three of the participating faculties (pharmacy and occupational and physical therapy) identified geriatric day hospitals, and subsequently the IEGC program, as one of their top three clinical placement selections. This desire to participate in the IEGC program may have contributed to better participant test scores.

It is important to note that the TSS measures the participants' perceived teaming skills and does not capture data by directly observing team skills or behaviours. At the onset of this study, the researchers were not aware of any validated instruments that measured teaming behaviour; therefore, team assessment checklists were used as a teaching and self-reflection tool but were not used to collect data. As a result, it is not possible to determine if the information collected from participants regarding their teaming behaviours was in fact present and observable. More recently, the

Canadian Interprofessional Health Collaborative (CIHC) has developed a set of competency domains for teaming including observable descriptors for each competency. This document is available as a .pdf at http://www.cihc.ca/files/CIHC_IPCompetencies_Feb1210.pdf.

Conclusion

The IEGC program was deemed a success in terms of fulfilling the program goals and objectives. The senior pre-licensure learners who participated in the IEGC program demonstrated and reported changes in their knowledge, attitudes, and behaviour regarding interprofessional collaboration and showed evidence of sustaining this knowledge in practice settings. Information collected through formative and summative evaluations indicated that participants enjoyed the IEGC program and did not find the workload onerous. That being said, some participants felt that their prior knowledge or experiences made the IEGC training redundant.

This IEGC study provides evidence to support clinicians, educators, and decision makers in pursuing the concept of interprofessional clinical placements that apply the principles of adult education and experiential learning. This study demonstrates the need for further evidence regarding interprofessional education for patient-centred collaborative practice. Future studies should strive for an adequate sample size, possibly through multi-site research, to allow for comparisons within and between clinical sites.

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Notes

1. *Clinical placements* refer to courses/learning opportunities that offer "real world" patient-/client-centred health/social care learning opportunities for senior students – also known as *clinical practicum*, *experiential learning*, *externship*, and *fieldwork*. For the purpose of this study, the term *clinical placement* was used to encompass all the aforementioned terms.
2. *Senior pre-licensure learner* was the term used to describe students in their final year of study of their respective programs who have not yet obtained their licensure to practice. This included undergraduate students in pharmacy, nursing, and physical therapy; graduate students in occupational therapy; and post graduate students in medicine (residents).

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