

## WEB PAPER

# Interprofessional clinical training improves self-efficacy of health care students

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## Abstract

**Background:** Interprofessional collaboration potentially enhances patient safety and satisfaction, and reduces tensions and conflicts among health professionals. However, health professionals often lack sufficient knowledge of other professional roles and competences to engage in interprofessional teamwork. The aim of this study was to assess the impact of an interprofessional training programme on students' perceived self-efficacy.

**Methods:** A quasi-experimental study with an intervention group (239 students) and a control group (405 students). The intervention was an interprofessional clinical study (ICS) unit including students from nursing, medicine, physiotherapy, occupational therapy, laboratory technology and radiography. Data on students' perceived self-efficacy were collected through web-based questionnaires. Aspects of self-efficacy measured were: (1) collaboration with other professions in planning goals and actions for patients; (2) collaboration with other professions for rehabilitation; (3) identifying the functions of other professions and (4) assessing and describing patients' needs and problems.

**Results:** All scores of perceived self-efficacy for the ICS group improved over time although one score change was non-significant ( $p=0.08$ ). After adjustment for baseline differences and the score change for the control group, the ICS group's self-efficacy score gain remained statistically significant.

**Conclusion:** The study showed that interprofessional training improved students' perception of self-efficacy more than traditional clinical training.

## Introduction

Interprofessionality has become an important issue in the debate about requirements of health care professionals and thus highlighted the need to further develop skills in interprofessional collaboration (Wood et al. 2009; Reeves et al. 2010; Rice et al. 2010; Scarvell & Stone 2010; Thistlethwaite & Moran 2010). Health care professionals are expected to work effectively in interprofessional and cross-specialized teams for the benefit of the patients. Interprofessional collaboration has many advantages, e.g. improved patient safety and reduced mortality rates (Morey et al. 2002; Mann et al. 2006), improved satisfaction (Lefebvre et al. 2007) and reduced tensions and conflicts among health professionals (Berry 2007). Furthermore, it has been established that collaborative practice is more effective when there are opportunities for shared decision-making and routine team meetings that enable health care workers to decide on common goals and patient management plans, balance their individual and shared tasks and negotiate shared resources (World Health Organization 2010). Interprofessional team competencies have been described as a necessary basis for creating coherent patient pathways (Lamb & Clutton 2010) and an integrated approach to care (Barr et al. 2011).

## Practice points

- Interprofessional training increases students' perceived self-efficacy more than traditional clinical training.
- Training in interprofessional collaboration is especially beneficial for students with low baseline self-efficacy scores.
- It is possible to evaluate the effect of interprofessional training on perceived self-efficacy using a quasi-experimental study design and the chosen web-based questionnaire.
- Further studies and investigation of the impact of the actual change in self-efficacy on patient satisfaction and patient safety are needed.

Such teamwork can create difficulties, however, as most health care professionals have either insufficient knowledge of each other's professional roles or inadequate competence in teamwork (McNair 2005). Knowledge about interprofessional principles, methods and basic education skills is a precondition for working interprofessionally, and it has been shown that interprofessional training can strengthen health students' competence in interprofessional collaboration (Ponzer et al. 2004; Reeves et al. 2009, 2010).

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Consequently, interprofessional training curricula have flourished and are now widespread in many countries, settings and health professions. A yet unresolved question is 'what is the effect of interprofessional training on the students' learning outcome?' This question has been addressed by different evaluations of interprofessional training through assessments of patients' and students' satisfaction in interprofessional settings published during the past 20 years (Barr 2002; Reeves 2002; Ponzer et al. 2004). However, few studies have investigated the impact of interprofessional training on students' perceived learning and changes in attitudes in an experimental set-up (Cooper et al. 2005; Lindqvist et al. 2005a, b). Self-efficacy refers to a person's confidence in own capability of successful performance in a specified situation or framework. Self-efficacy is an essential mechanism for a person's motivation to reach his/her goals and the higher the level of self-efficacy, the higher the level of motivation and the greater the effort to reach a personal goal (Bandura & Cervone 1983; Bandura 1993, 1997). Differences in self-efficacy have been shown to be associated with differences in skill level (Gist & Mitchell 1992; Bandura 1997) and self-efficacy has become a key variable in assessing organizational behaviour (Schwarzer & Fuchs 1995).

The aim of this study was to assess the impact of interprofessional clinical training on students' perception of self-efficacy in interprofessional collaboration.

### The intervention

In 2007, the Department of Orthopaedic Surgery, Kolding Hospital, Denmark, established an interprofessional clinical study (ICS) unit for students from the following professions: nursing, medicine, physiotherapy, occupational therapy, laboratory technology and radiography.

The organization of the ICS was inspired by the explorative work of Barr et al. (2005) with the aim of creating a new environment for learning, where students could learn from each other and develop competence in interprofessional collaboration and reflection.

The ICS developed a two-week clinical training programme for students in the selected professions, who worked in the ward during the day and evening but not at night or weekends. The timing of ICS training differed for the various professions; the students should be at a stage in their education where they had developed a professional identity and were able to contribute constructively to the interprofessional learning process.

The overall objectives of the ICS were that the students after their interprofessional training should be able to:

- enter into interprofessional collaboration to benefit patient treatment, care and rehabilitation,
- practice uni-professional duties and develop knowledge, attitudes and skills according to the students' educational level and
- develop inter- and uni-professional competence based on authentic patients' health problems and management.

A facilitator team that included representatives from the six involved professions was responsible for the ICS training.

Based on the available literature on learning and teaching in a clinical set-up, the facilitator competencies were described and included knowledge of supervision and reflection, and documented diploma-level pedagogical skills (Barr et al. 2005; Freeth et al. 2005). As reflection is considered a key strategy in interprofessional learning (Freeth et al. 2005; Oandasan & Reeves 2005), interprofessional reflection was planned as a daily learning scenario in the ICS. The reflection could be placed before, in or after action, and it could be both formal and informal (Carpenter & Dickinson 2008). The formal reflection could be led by one of the facilitators, the project leader, a student or a vicar with specific ethical knowledge.

## Methods

### Design

The study was designed as a quasi-experimental intervention study, where students in the intervention group received interprofessional clinical training at the ICS while students in the control group received usual clinical training. Data collection took place from September 2008 to April 2010. Self-completed web-based questionnaires were administered to students in the two groups before and after their clinical training.

The experimental design is shown in Figure 1. The two streams of students are denoted as the intervention group (ICS) and control group (CG). The design allowed comparison of development over time (i.e. comparison of scores after clinical training (T3) with baseline (T1) for both groups). For the intervention group an additional data collection took place immediately after the clinical training (denoted by T2), thus enabling assessment of short-term effects (i.e. comparison of scores at T2 with T1) and maintenance of the effect over time (i.e. comparison of scores at T3 with T2). The design also enabled comparison of the scores for the two groups before and after their clinical training (i.e. comparison of T1 scores and T3 scores between ICS group and CG). Finally, the design enabled assessment of additional effects (change in scores) due to the intervention (i.e. comparison of ICS (T3–T1) with CG (T3–T1)). This last comparison can be interpreted as the additional effect of the experimental group in comparison with the control group.

### Sample and questionnaire administration

Students for the intervention group were recruited by the clinical training supervisors from the involved university and colleges (University of Southern Denmark, Odense; University College Lillebaelt, Vejle; University College West, Esbjerg and VIA University College, Aarhus).

Students for the control group were recruited from other hospitals in the region and were similar to the intervention group in terms of stage of education and duration of clinical training.

The supervisors responsible for the two groups of students provided lists of names and current e-mail addresses that were

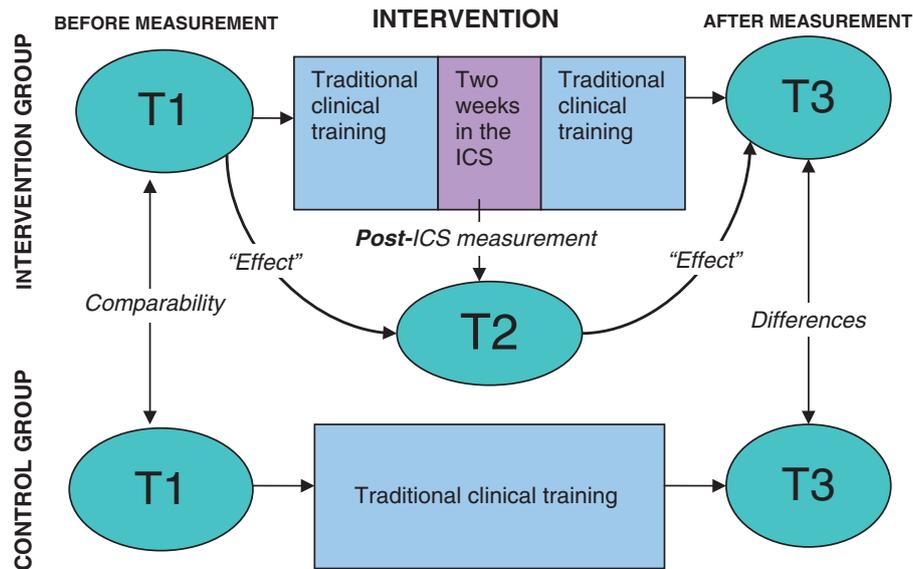


Figure 1. Study design.

entered into the web-based survey system 'SurveyXact' (<http://www.surveyxact.dk> (Danish)). Using the functions of SurveyXact, personal e-mails were sent to all students inviting them to follow a link to their personal questionnaire. A single reminder was sent two weeks later to students who had not yet completed the questionnaire.

### Self-efficacy questions

The online questionnaire included an instrument that assesses perceived self-efficacy in interprofessional collaboration that was pioneered and validated by Parle et al. (1997) and translated into Danish (Ammentorp et al. 2007; Nørgaard 2011). The instrument consisted of the following four questions (in English translation):

To what extent do you believe that you successfully can... (1) *Collaborate with other professions in planning goals and actions for patient rehabilitation?* (2) *Collaborate with other professions for rehabilitation in an inpatient ward?* (3) *Identify the functions of other professions in relation to inpatient care?* (4) *Clearly assess and describe patients' needs and problems, so that other professions can engage in a dialogue about goals and actions?*

The questions were developed by convenience sampling based on the overall aims of the ICS unit. The questions were pilot tested on 15 students; seven students from the ICS and eight students from conventional clinical training. The aim of the piloting was to test whether the questions were understandable and could contribute meaningful answers to the analyses.

Respondents were asked to rate each of these statements on an 11-point scale where 0 denoted 'Not certain at all' and 10 denoted 'Very certain'.

The online questionnaire also included questions on age, gender and professional training.

### Analysis

The study population was first described in terms of gender and profession. In an analysis of non-response, the numbers of students who were invited to respond and those who completed the questionnaires at A1/B1 were compared and a chi-squared test was used to test for differences between the two groups. We estimated response rates separately for the intervention and control groups and tested for differences in characteristics for those students who responded to both T1 and T3 questionnaires and those who only responded to T1 questionnaires.

Variations in the mean scores of the four self-efficacy questions were analysed separately for the ICS and CG at each time of data collection.

In the subsequent analyses we assumed that the four score items were normally distributed, although this could not be confirmed by visual inspection of the normal probability plots or the Shapiro–Wilk test for normal distributed data (partly due to the low number of outcome categories).

We initially applied unpaired *t*-tests to assess the following score difference: ICS baseline versus control group baseline; ICS baseline (T1) versus after the interprofessional training (T2); ICS baseline (T1) versus after the clinical training period (T3); control group baseline (T1) versus after the clinical training period (T3) and finally ICS(T1–T3) versus CG(T1–T3). To test for differences after adjustment for gender, profession, between-group baseline differences and changes over time in the control group, we used mixed regression, which took into account intra-personal correlation.

All statistical analyses were done using Stata release 11 (StataCorp 2001 Statistical software; College station, TX: Stata Corporation).

**Table 1.** Gender and profession of students invited and responding to the self-efficacy questions.

	Invited to participate		Respondents				
	ICS ( <i>n</i> = 239) (%)	CG ( <i>n</i> = 405) (%)	T1		T2	T3	
			ICS ( <i>n</i> = 200) (%)	CG ( <i>n</i> = 145) (%)	ICS ( <i>n</i> = 195) (%)	ICS ( <i>n</i> = 127) (%)	CG ( <i>n</i> = 159) (%)
<i>Gender</i>							
Male	17.2	7.7	20.5	17.2	18.5	11.8	12.6
Female	69.5	32.6	79.5	82.8	72.8	82.7	47.8
Not indicated	13.4	59.8	0.0	0.0	8.7	5.5	39.6
<i>Students</i>							
Nurse	35.2	55.6	34.5	30.3	30.3	45.7	57.2
Medical	12.1	11.1	13.0	13.8	14.4	13.4	6.9
Radiographer	15.9	8.4	16.5	12.4	15.9	6.3	3.1
Physiotherapist	16.3	14.1	18.0	22.8	19.0	14.2	17.0
Occupational therapist	16.7	6.4	17.0	11.0	17.4	15.8	8.2
Medical laboratory technician	3.8	4.4	4.0	9.7	3.1	4.7	7.6

Notes: ICS = interprofessional clinical study unit; CG = control group; T1 = before measurement (Time 1); T2 = measurement after ICS training (only ICS group) (Time 2) and T3 = measurement after clinical training period (Time 3).

## Results

### Population

During the study period the ICS programme recruited 239 students, of whom 200 (84%) completed the baseline questionnaire (T1), 195 (82%) completed the questionnaire immediately after completion of the ICS programme (T2) and 127 (35%) completed the questionnaire after completion of clinical training (T3). Approximately, half (120; 51%) of the ICS students returned both the T1 and T3 questionnaire.

Clinical supervisors from other hospitals identified 405 students for the control group, of whom 145 (36%) students returned the T1 questionnaire and 159 (39%) returned the T3 questionnaire. In all, 95 (23%) students returned both the T1 and T3 questionnaire.

There were no statistically significant differences between the questionnaire responders in the intervention and control groups in terms of gender or professional background (Table 1).

### Self-efficacy

There were no statistically significant differences in mean self-efficacy scores for the two groups at baseline (Table 2). Mean scores on all four self-efficacy questions increased significantly for the students in the intervention group after completion of the ICS programme (T2), and these scores were maintained at the end of the students' clinical training (T3).

Self-efficacy scores for students in the control group showed no significant change at the end of clinical training (T3) for two of the questions, but showed significant increases for 'Identifying other professions' functions' ( $p=0.04$ ) and 'Describing patients' needs to enable interprofessional dialogue' ( $p < 0.01$ ).

Differences over time in the mean self-efficacy scores are presented in Figure 2(a) and (b) for the intervention and control group.

The mean scores were always higher for the intervention group than the control group at T2 and T3, with the between-group difference varying between 0.5 and 0.9. This greater improvement for the intervention group was statistically significant for the first three self-efficacy questions, and borderline for the fourth ( $p=0.08$ ).

Linear mixed regression was used to adjust for gender and profession (Table 3). The mean score difference of the intervention group was still larger than that of the control group although the size of the difference was smaller after adjustment. Radiography and laboratory technology students scored significantly lower than the students from other professions on self-efficacy questions 1, 2 and 4.

No significant differences between men and women were found.

Baseline self-efficacy scores were between 6.5 and 7.4 on a scale from 0 to 10 and therefore data were tested for as ceiling effect. The highest possible score of 10 was obtained in less than 6% at baseline (T1), in less than 9% after the ICS training (T2) and in less than 10% at the end of the clinical training period (T3). To further test the internal reliability of the questionnaire a Cronbach's alpha was estimated for the collapsed questions showing an alpha of 0.85 (between 0.77 and 0.86).

## Discussion

Interprofessional team training increased health care students' perceived self-efficacy in interprofessional collaboration compared to traditional clinical education.

Students from ICS reported higher scores of two dimensions of self-efficacy: question 1 'Collaborate with other

**Table 2.** Scores of self-efficacy.

	Mean (SD) <i>n</i>	Mean (SD) <i>n</i>	<i>p</i> -value
<i>Q1: Collaborate with other professions in planning of goals and actions for patients' rehabilitation</i>			
ICS(T1) = CG(T1)	7.4(1.9)200	7.2(2.0)145	0.45
ICS(T1) = ICS(T2)	7.4(1.8)176	8.4(1.8)176	<0.01
ICS(T1) = ICS(T3)	7.4(1.9)120	8.2(2.0)120	<0.01
CG(T1) = CG(T3)	7.1(2.1)95	7.1(2.3)95	0.87
ICS(T1-T3) - CG(T1-T3)	0.8(2.1)120	0.0(2.5)95	0.01
<i>Q2: Collaborate with other professions about rehabilitation in an inpatient ward</i>			
ICS(T1) = CG(T1)	7.2(2.1)200	7.0(2.0)145	0.48
ICS(T1) = ICS(T2)	7.3(2.0)176	8.1(2.0)176	<0.01
ICS(T1) = ICS(T3)	7.3(2.0)120	8.1(2.0)120	<0.01
CG(T1) = CG(T3)	7.0(2.2)95	7.1(2.3)95	0.78
ICS(T1-T3) - CG(T1-T3)	0.8(2.1)120	0.1(2.6)95	0.02
<i>Q3: Identify other professions' functions concerning inpatients</i>			
ICS(T1) = CG(T1)	6.8(1.9)200	6.5(2.2)145	0.24
ICS(T1) = ICS(T2)	6.8(1.9)176	8.3(1.6)176	<0.01
ICS(T1) = ICS(T3)	6.7(1.9)120	8.2(1.5)120	<0.01
CG(T1) = CG(T3)	6.4(2.3)95	7.1(1.9)95	0.04
ICS(T1-T3) - CG(T1-T3)	1.5(2.1)120	0.6(2.8)95	0.01
<i>Q4: Assess and describe patients' needs and problems clearly, so that other professions can engage in a dialogue about goals and actions</i>			
ICS(T1) = CG(T1)	7.1(1.9)200	7.1(1.9)145	0.87
ICS(T1) = ICS(T2)	7.1(1.9)176	8.0(1.7)176	<0.01
ICS(T1) = ICS(T3)	7.0(1.9)120	8.2(1.6)120	<0.01
CG(T1) = CG(T3)	6.9(2.1)95	7.6(1.9)95	<0.01
ICS(T1-T3) - CG(T1-T3)	1.2(1.9)120	0.7(2.2)95	0.08

Notes: ICS = interprofessional clinical study unit; CG = control group; T1 = before measurement (Time 1); T2 = measurement after ICS training (only ICS group) (Time 2) and T3 = measurement after clinical training period (Time 3).

professions in planning of goals and actions for patients' rehabilitation' and question 2 'Collaborate with other professions about rehabilitation in an inpatient ward', yet with differences between the professions. The lower scores from radiography and laboratory technology students on self-efficacy questions concerning collaboration in planning and performing rehabilitation might appear to reflect their main role as providers of clinical information to support care providers rather than providing the care itself.

Despite the differences between professions, the differences in self-efficacy mean scores from T1 to T3 were significantly higher in all four dimensions for the ICS group compared to the control group.

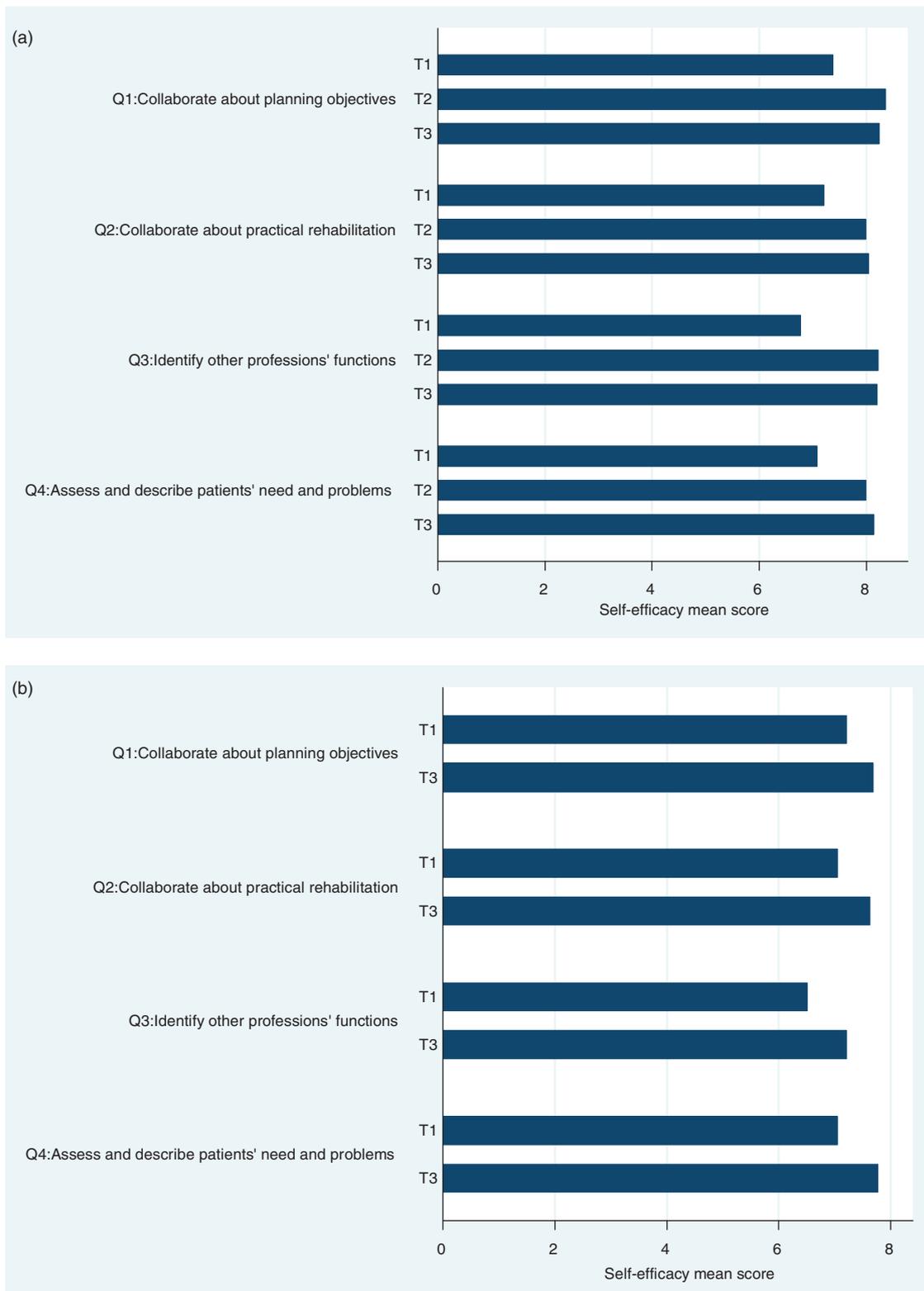
Self-efficacy was chosen as the outcome variable as it has previously been shown to be an efficient and reliable method for monitoring professionals' benefits of attending a communication skills training course (Ammentorp et al. 2007; Ammentorp & Kofoed 2009; Nørgaard 2011).

The study has shown significantly increased self-efficacy scores after interprofessional training and the effect was still present at the end of the students' clinical training period. The effect was most clear for the groups with the lowest self-efficacy at baseline, e.g. the laboratory technician students had the lowest baseline self-efficacy (mean 6.6), but the highest self-efficacy at T2 (mean 8.6). This corroborates previous results, where a lower baseline increased the likelihood of a greater effect of an intervention (Riiskjær et al. 2009). However, although the self-efficacy score increased significantly after the interprofessional training, it is not known whether improvement in perceived self-efficacy leads to more collaborative team behaviour. There is limited evidence

demonstrating clear positive effects on teamworking within health and social care research. This may in part be due to the measurement challenges inherent in evaluations, different objectives within teams, varying local contexts and the use of different research theories (Jelphs & Dickinson 2008).

Baseline self-efficacy scores were relatively high (varying between 6.5 and 7.4 on a scale from 0 to 10). As it has been pointed out that self-ratings are reactive measures, with the measure itself as an influence on the outcome (Jenkins et al. 2001; Maguire & Pitceathly 2002) it could be argued that the self-rating survey used in this study would represent a methodological weakness, but no ceiling effect was found. The low response rate for the control group (23%) should be noted as it may impact the validity and generalizability of these findings. Results from previous studies are ambiguous regarding the significance of non-responders. While non-participation can result in significantly biased results in some studies (Bergstrand et al. 1983; Rubin 1990), its impact in others appears small (Lasek et al. 1997). The risk of selection bias should be taken into account when drawing conclusions from this study. It could be argued that respondents in the ICS group were those who were particularly positive towards interprofessional training, while responders in the control group may have been those who were more dissatisfied with traditional clinical training. It is reassuring, however, that response rates were similar across professions (data not shown).

The systematic and standardized interprofessional training approach is a major strength of the current study. It appears to have contributed to improve the students' interprofessional skills, and the training was easily adapted to clinical practice. The significant effect of interprofessional training found in this



**Figure 2.** (a) ICS students' self-efficacy before (T1) and after (T2) the ICS training, and at the end of their clinical training (T3). A higher score shows higher self-efficacy and (b) control group students' self-efficacy before (T1) and at the end of their clinical training (T3). A higher score shows higher self-efficacy.

study corroborates the results of previous studies, where interventions involving active training methods have produced larger effect sizes than interventions using passive methods (Mansouri & Lockyer 2007). Effectiveness studies can

contribute important information in the planning of interventions in larger organizational settings. Further investigation is needed to determine whether interventions only show the intended impact in controlled and limited efficacy studies or

**Table 3.** Mixed regression results of scores for the four self-efficacy questions adjusted for profession.

Variable	Q1	Q2	Q3	Q4
Gain over time ICS	0.80**	0.72*	0.96**	0.48
Change over time CG	-0.04	0.01	0.55*	0.63*
Baseline difference CG-ICS	0.13	0.14	0.24	-0.03
<i>Profession</i>				
Medical students	0.24	0.00	0.38	0.10
Radiograph students	-1.23***	-1.16***	0.67*	-0.36
Physiotherapist students	0.07	0.05	-0.11	-0.17
Occupational students	-0.32	-0.46	-0.23	-0.70**
Medical laboratory technology students	-1.95***	-2.15	0.18	-2.16***
<i>Gender</i>				
Male	0.33	0.37	-0.33	0.18
Constant	7.27***	7.19***	6.70***	7.26***
R <sup>2</sup>	0.14	0.16	0.12	0.15
n(obs.)	561	561	561	561
n(pers.)	346	346	346	346

Notes: \* $p < 0.005$ ; \*\* $p < 0.01$  and \*\*\* $p < 0.001$ .

whether it is possible to transfer the results into real-world situations and thereby improve the quality of patient care.

## Conclusion

Interprofessional team training increased health care students' perceived self-efficacy in interprofessional collaboration compared to traditional clinical education. The ICS students reported significantly higher self-efficacy scores in three out of four dimensions of self-efficacy, and significantly increased self-efficacy mean scores from T1 to T3 in all four dimensions compared to the control group, yet with differences between the professions. Our study contributes evidence of the positive impact of interprofessional training on students' perceived self-efficacy.

## Practice implications

Students perceive to acquire competencies that enhance their interprofessional working through collaborative training involving students from related professional groups. It may be relevant to include interprofessional team training into the curricula for health care students.

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