THE ASIA-PACIFIC SCHOLAR
MEDICAL AND HEALTH PROFESSIONS EDUCATION

ORIGINAL ARTICLE

Published online: 2 January, TAPS 2018, 3(1), 27-37
DOI: https://doi.org/10.29060/TAPS.2018-3-1/OA1064

Assessment of attitudes for interprofessional team working and knowledge of health professions competencies for final year health professional students

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Abstract

Inter-professional education (IPE) contributes to the development of an 'inter-professional, collaborative and practice-ready' healthcare workforce that is well prepared to respond to local healthcare needs. Little is known about the extent, to which health professional students who are nearing graduation understand the competencies of diverse health professions. The aim of this study was to investigate the perception of final-year undergraduate students' towards interprofessional team working and their knowledge of the competencies of 6 health professions. This study evaluated the final-year health professional students' from six (6) health professions programmes namely medical, dental, nursing, pharmacy, dietetics and biomedical sciences programmes. Attitudes towards Health Care Team Scale (ATHCTS) was used to measure students' attitudes towards teamwork while a checklist was used measure students' knowledge of 6 health professionals competencies. Construct validity was ascertain and findings from ATHCTS showed mean scores ranges from 48.57 to 54.23 indicating positive attitudes toward working within interprofessional health care teams. While the ACTHS findings were positive, the competencies checklist showed mixed findings in that students correctly identified some competencies and had misconceptions for others. For example, the majority of students regarded physicians as competent in 'assessment and evaluation' and 'medication management' while less than 50% of participants recognised the importance of assessment of patient's health-illness as a competency for dieticians. Gaps identified in final year students' knowledge of the roles and competencies of health professions has an impact on future interprofessional collaborative practice suggesting a need to further improve curriculum design and delivery of IPE.

Keywords: *Allied Health, Inter-Professional, Learning, Inter-Professional Education*

Practice Highlights

- Little is known about the extent, to which health professional students who are nearing graduation understand the competencies of diverse health professions.
- The findings indicated the final-year health professional students from six (6) health professions programmes namely medical, dental, nursing, pharmacy, dietetics and biomedical sciences programmes have positive attitudes toward working within interprofessional health care teams.
- There were mixed findings in students' perceptions of competencies of health professions.
- Gaps identified in final year students' knowledge of the roles and competencies of health professions suggesting a need to enhance curriculum design and delivery of IPE.

I. INTRODUCTION

Interprofessional collaborative practice (IPC) in health care has been widely recognised as a potential solution to improve healthcare delivery. IPC has been linked with improved service provision, health outcomes, patient safety (Lemieux-Charles & McGuire, 2006; Mickan,

2005), and reduced mortality and hospitalisation (Malone, Marriott, Newton-Howes, Simmonds, & Tyrer, 2007; McAlister, Stewart, Ferrua, & McMurray, 2004). Awareness and understanding of one's own and others' professional roles, responsibilities and value in patient care is an important prerequisite for IPC to occur (Suter, 2009).

Interprofessional education (IPE) is viewed as the means to prepare an inter-professional health workforce that can better respond to local healthcare needs. The World Health Organisation describes IPE as a learning event when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes (World Health Organization, 2010). The ultimate goal of IPE is to prepare students for Interprofessional Collaboration (IPC), by becoming collaborative interprofessional team members who display respect and positive attitudes towards each other as well as focusing on shared and positive patient outcomes. IPE is also expected to enhance students with interpersonal skills needed for liaison and communication.

A systematic review performed by Hammick, Freeth, Koppel, Reeves and Barr (2007) identified, organised and synthesised the best available contemporary evidence from the strongest evaluations of IPE evidence involving health professional students at the undergraduate level. The findings suggested that IPE is more effective in relation to 'reaction' and 'learning', with much less evidence of impact on 'behaviour' and 'results'. It has also been postulated that to achieve positive effect of IPE, validity and customization as well as legitimacy of IPE is required (Hammick et al., 2007).

Much international literature has discussed the promotion of IPE in terms of when it should take place, how it should be managed, who will be involved, and what should be taught (Thistlethwaite 2012). In the discussion of what should be taught, little is mentioned about how each other's responsibilities could be collaboratively optimised in the healthcare setting. Less is also known about students' perceptions of the roles and competencies of other health professions which could affect their future collaborative work. In addition to that, there are lesser publications on IPE for some of the allied health sciences programmes such as dietetics, biomedical science and pharmacy. This can be seen from majority of the IPE publications, which are done within professions of medicine, dentistry and nursing (Curran, Sharpe, Forristall, and Flynn, 2008; Heinemann, Schmitt, Farrell, and Brallier, 1999; Spence & Weston, 1995).

IPE initiatives need to account for differences in perceptions of what IPC is and how it can be achieved in practice. Yet little is known about how much health professional students who are nearing graduation understand roles and responsibilities of the different health professions. This study evaluated final-year health professional students from six (6) health professions programmes on their perceptions towards interprofessional team working and their knowledge of the roles and competencies of health professions.

II. METHODS

A. Study design

This cross-sectional study was conducted at a medical and health sciences university (International Medical University), located in Kuala Lumpur, Malaysia to assess students' perceptions on interprofessional team working and understanding of roles and competencies of different health professions. All final-year students pursuing medical, dental, pharmacy, nursing, dietetic, and biomedical sciences programmes were invited to participate in this study. Students who provided the consent and completed the study instrument were included in the study sample.

B. Data collection tool

The data collection tool used in this study was divided into three parts. The first part covered the socio-demographic characteristics of the study participants. The second part of the questionnaire collected data on students' agreement on team working using the Attitudes towards Health Care Team Scale (ATHCTS). A 14-item Attitudes Toward Health Care Teams (ATHCT), adapted from Heinemann, Schmitt and Farrell (2002) was used to measure attitudes towards working on interprofessional healthcare teams. In the ATHCT scale (Heinemann et al., 1999), the authors identified three main factors namely quality of care, costs of team care and physician centrality, having 14, 7 and 6 items, respectively. For the purpose of our study, we followed Curran et al. (2008) approach and selected 11 items from the quality of care factor and 3 items from the costs of team care factor. As described by Curran et al. (2008), selected items are appropriate and relevant for undergraduate health science students who would have little or no experience with items relating to physician centrality (factor 3). Responses were scored on a five-point Likert scale ranging from one (strongly disagree) to five (strongly agree). Three items which were related to time constraints were reverse coded because they were negative statements. Higher scores indicate more positive attitudes toward interprofessional health care teams.

The last part was a self-developed form to collected data on students' perception and understanding of health

professions roles and competencies in patient care. Responses were scored on a five-point Likert scale ranging from one (highly competent) to five (least competent). A total of 15 items consisting of the roles and competencies of health professionals in patient care was included. These 15 items covered three broad areas of assessment and evaluation, provision of care and medication management.

C. *Sampling procedure*

During the data collection phase, researchers approached final-year cohorts of medicine, dentistry, pharmacy, nursing, dietetics, and biomedical sciences students at IMU to provide information about the study. Questionnaires were provided with a copy of participant information sheets and consent forms. Convenience sampling was used to enrol all the eligible respondents during the study period. Participants were briefed by the researchers before completing the questionnaire. Participation was anonymous and voluntary, with no reward for participation. Researchers were there in person to clarify any doubts from students. The participants were approached after major teaching and learning sessions to obtain higher response rate. Responses from final-year students were collected within 6 month prior to completion of the programmes. The content and the teaching methods remained stable over the period in which the information was collected.

D. *Statistical analysis*

Both descriptive and inferential data analyses were performed using SPSS® version 22 with 0.05 as the level of significance. Descriptive statistics was used to generate summary estimates on the participants by programme. Frequencies, percentages, mean, and standard deviations were also calculated. Since ATHCTS has not been previously used in Malaysia, we conducted a Principal Component Analysis (PCA) to examine the underlying components of ATHCTS in Malaysian students. The sample size was 301, which is sufficient to perform factor analysis. Kaiser-Meyer-Olkin test (KMO) was performed to measure sampling adequacy of >0.7. Bartlett's test of sphericity was used to measure significant correlations between variables. The corrected item-total score correlations were also examined. Internal consistency was analysed using Cronbach's alpha. Independent T-test and one-way analyses of variance (ANOVA) including post hoc tests were computed to examine differences in scores related to gender, age, and programme. Chi-square test for association and Pearson test for correlation were also applied.

III. RESULTS

A. *Participants' Demographics*

Of 443 students approached, 301 accepted and completed with an overall response rate of 67.9%. These 301 respondents represented more than 50% of the final year medical, dentistry, pharmacy, dietetics, nursing, and biomedical sciences students. Final-year nursing students had the lowest population due to small cohort size as shown in Table 1. The mean age of participating students was 23.17 with a standard deviation of 1.42. Majority of the students were females (67.5%), aged between 23 and 25 years (63.6%) and enrolled in Medicine (37.5%) and Pharmacy (27.2%) programmes. Table 1 summarizes the demographic data of the participants.

B. *The construct and reliability of ATHCTS*

The adapted ATHCTS (Curran et al., 2008) consists of 14 items that measure attitudes toward inter-professional health care teams was employed in this study. Table 2 summarizes the assessment of reliability and validity of the adapted ATHCTS using the 301 final-year health professional students in this current study.

Factor loadings of all items were above 0.40, and item 13 had the strongest factor loading of 0.778. Internal consistency of the ATHCTS was good at 0.93. Using exploratory factor analysis, the authors identified two factors: quality of care and time constraint. The quality of care subscale (Items 1–11) showed good internal consistency (alpha: 0.83), whereas Cronbach's alpha for time constraints (Items 12–14) was very low (alpha: 0.54).

Items	N	%
Age (mean, SD)	23.27 (1.42)	
Age groups		
20-22	96	31.8
23-25	192	63.6
26 and above	14	4.6
Gender		
Female	204	67.5
Male	97	32.1
School		
Medical	113	37.5
Dentistry	36	12.0
Nursing	14	4.7
Pharmacy	82	27.2
Biomedical	23	7.6
Dietetics	33	11.0

Table 1. Demographic characteristics of the study participants (n=301)

No	Items (sequence in scale)	Rotated Factor Coefficients	
		Quality of Care (Factor 1)	Time Constraints (Factor 2)
1	The inter-professional approach improves the quality of care to patients/clients (2).	0.661	-
2	The inter-professional approach permits health professionals to meet the needs of family caregivers as well as patients (17).	0.668	-
3	Having to report observations to a team helps team members better understand the work of other health professionals (18).	0.641	-
4	The inter-professional approach makes the delivery of care more efficient (16).	0.652	-
5	Hospital patients who receive inter-professional team care are better prepared for discharge than other patients (15).	0.576	-
6	Team meetings foster communication among team members from different professions or disciplines (3).	0.598	-
7	The give and take among team members helps them make better patient/client care decisions (12).	0.565	-
8	Patients/clients receiving inter-professional care are more likely than others to be treated as whole persons (4).	0.631	-
9	Health professionals working as teams are more responsive than others to the emotional and financial needs of patients/clients (9).	0.563	-
10	Working in an inter-professional environment keeps most health professionals enthusiastic and interested in their jobs (5).	0.613	-
11	Developing a patient/client care plan with other team members avoids errors in delivering care (7).	0.436	-
12	*Working in an inter-professional manner unnecessarily complicates things most of the time (1).	-	0.538
13	*In most instances, the time required for inter-professional consultations could be better spent in other ways (13).	-	0.778
14	*Developing an inter-professional patient/client care plan is excessively time-consuming (10).	-	0.748
Cronbach's alpha		0.83	0.54
Percent of variance (%)		30.51	11.30

*Denotes reverse coded items

Table 2. Factor Analysis and corrected item-total score correlations of the ATHCTS

No	Items	Factor Loadings			
		Curran et al. (2008)	Hayashi et al. (2012)	Kim et al. (2014)	Present (2016)
1	The inter-professional approach improves the quality of care to patients/clients.	0.68	0.51	0.61	0.66
2	The inter-professional approach permits health professionals to meet the needs of family caregivers as well as patients.	0.64	0.63	0.72	0.67
3	Having to report observations to a team helps team members better understand the work of other health professionals.	0.63	0.56	0.66	0.64
4	The inter-professional approach makes the delivery of care more efficient.	0.61	0.44	0.71	0.65
5	Hospital patients who receive inter-professional team care are better prepared for discharge than other patients.	0.61	0.54	0.79	0.58
6	Team meetings foster communication among team members from different professions or disciplines.	0.60	0.76	0.70	0.59
7	The give and take among team members helps them make better patient/client care decisions.	0.54	0.60	0.76	0.56
8	Patients/clients receiving inter-professional care are more likely than others to be treated as whole persons.	0.52	0.32	0.70	0.63
9	Health professionals working as teams are more responsive than others to the emotional and financial needs of patients/clients.	0.51	0.74	0.68	0.56
10	Working in an inter-professional environment keeps most health professionals enthusiastic and interested in their jobs.	0.51	0.36	0.55	0.61
11	Developing a patient/client care plan with other team members avoids errors in delivering care.	0.49	0.27	0.62	0.44
12	*Working in an inter-professional manner unnecessarily complicates things most of the time.	0.65	0.36	0.80	0.54
13	*In most instances, the time required for inter-professional consultations could be better spent in other ways.	0.59	0.24	0.88	0.78
14	*Developing an inter-professional patient/client care plan is excessively time-consuming.	0.42	0.79	0.76	0.75
	Cronbach's alpha for Quality of Care	0.82	-	0.92	0.83
	Cronbach's alpha for Time Constraints	0.56	-	0.86	0.54
	N	1179	285	288	301
	Disciplines	UG Health Sciences	UG Health Sciences	G Health professionals	UG Health Sciences

Note: UG = Undergraduate, G = Graduate

Table 3**.** Comparison of factor loadings among Curran et al. (2008), Hayashi et al. (2012), Kim et al. (2014) and present study

Item	Categories		SD	
Gender	Female	51.32	5.44	t = 0.963
	Male	52.00	6.22	
Age	20 – 22	51.13	5.17	F = 8.312
	23 – 25	50.78	5.94	p = 0.001
	> 25	54.23	5.25	
Discipline	Medical (n=113)	53.14	5.92	F = 4.901
	Dentistry (n=36)	51.69	6.10	p = 0.001
	Nursing (n=14)	49.64	5.81	
	Pharmacy (n=82)	50.10	5.47	
	Dietitics (n=33)	52.42	4.15	
	Biomedical (33)	48.57	3.96	

*. The mean difference is significant at the 0.05 level. Scale: 1 (strongly disagree) to 70 (strongly agree)

Table 4. Mean score of ATHCTS questionnaire, by participants' gender, age and discipline

Items		Nurse	Dentist	Physician	Pharmacist	Biotechnologist/ Biomedical Scientist	Dietician
Assessment and Evaluation							
1.	Assesses patient's health-illness.	68.5	69.5	95.7*	55.6	20.5	48.7
2.	Obtains and records the patient's and family's health history.	71.5	78.5	92.7*	65.2	22.5	59.6
3.	Performs a physical examination.	48.0	68.5	97.4*	22.2	10.9	26.5
4.	Orders routine laboratory investigations.	25.2	64.6	87.4*	36.1	38.7	22.2
Provision of Care							
5.	Performs laboratory investigations.	12.3	29.1	35.8	19.2	74.8*	11.9
6.	Provides care that encompasses the physical, psychosocial, developmental, cultural, & spiritual levels.	72.5	53.6	73.2*	47.4	14.6	48.7
7.	Provides health education to patient and family.	72.2	72.8	88.7*	73.2	21.5	68.5
8.	Provides advice on strategies to adopt a healthy caloric plan	31.8	25.5	53.0	33.4	10.9	86.8*
9.	Initiates treatment and therapeutic regimens.	28.5	70.9	94.4*	63.6	8.9	26.2
10.	Advises on referrals to other health professionals if necessary.	39.4	76.2	92.7*	60.9	28.8	51.7
Medication Management							
11.	Prescribes medications.	19.2	67.5	93.0*	83.8	6.3	9.9
12.	Administers medications.	78.1	72.5	86.8*	74.5	10.6	14.2
13.	Makes adjustment to medications.	17.2	66.6	92.4*	82.1	8.6	22.5
14.	Provides counselling regarding the medications to individuals and families.	47.0	62.3	84.1	85.8*	15.6	34.1
15.	Evaluates progress of patient with medications.	57.0	64.2	90.7*	70.9	9.9	30.1

*Denotes healthcare professions who are perceived as most competent

Table 5. Proportion (%) of participating students who considered healthcare professionals as competent or highly competent for specific roles and competencies

Table 3 shows the factor structure found in this study is similar to the previous studies (Kim & Ko, 2014; Curran et al., 2008) except Hayashi et al. (2012) confirming the construct validity of ATHCTS tool in current study using undergraduate health profession students. Hayashi et al. (2012) identified three factors within the list of 14 items

using an exploratory factor analysis: quality of care delivery, patient-centered care and team efficiency. They identified an additional subscale consisting of 4 items, which is different from the two-factor solution yielded by other three studies.

C. Attitudes towards team working

Table 4 summarizes the attitudes of participants towards working on interprofessional healthcare team according to gender, age and programme. All mean scores ranges from 48.57 to 54.23 indicating positive attitudes toward working on interprofessional health care teams.

Male students and students aged above 25 years were found to have higher mean scores compared with female and students aged 25 years and below. Medical students had the highest mean score compared to the rest, followed by dietetic and dental students.

D. Knowledge of roles and competencies

Table 5 summarizes the proportion of participants who considered health professionals as competent or highly competent, according to roles and competencies needed for patient care. A list of 15 items consisting of common roles and competencies of various health care professionals, were provided to participating students. The participating students were instructed to indicate "highly competent" to "least competent" for each item. The healthcare professions who are perceived as most competent had the highest scores for both the 'highly competent' and 'competent' in each of items.

Physicians were regarded as the most competent in all items related to 'patient assessment' (ranging from 87.4% to 97.4%), except for three items. In terms of 'performing laboratory investigations', biotechnologists and biomedical scientist were regarded to be most competent (74.8%), while dieticians were most competent in providing advice on strategies to adopt a healthy caloric plan (86.8%). Most students also perceived physicians to be competent/highly competent in providing care related to physical, psychosocial, developmental, cultural and spiritual matters (73.2%), providing health education to patient and family (88.7%), initiating treatment and therapeutic regimens (94.44%), and advise on referrals (92.7%). Dentists were second to physicians with regards roles and competencies related assessment and evaluation of patients and providing referrals. Nurses on the other hand, received higher scores compared to other professions (except physicians) for provision of care related to physical and psychosocial factors and in health education.

Majority of the students also perceived physicians to be competent/highly competent in most areas of 'medication management' (ranging 86.8% to 93%) except medication counseling. Pharmacist were regarded as the second to physicians with competent/highly competent skills in medication prescribing (83.8%), making adjustment to medication (82.1%) and evaluate patient progression with medication (70.9%).

IV. DISCUSSION

The main objectives of this study were to evaluate attitudes toward working in interprofessional health teams and determine the perception and understanding of final year health professional students on roles and competencies of health professions. The ability to work with professionals from other professions to provide effective healthcare is an important element of professional practice requiring the right attitude towards team working and a specific set of competencies. While there are studies evaluating attitudes toward working in interprofessional health teams among medical, pharmacy, dentistry and nursing students, attitudes towards other allied health professional programmes and of dietetics and biomedical sciences students were less reviewed. Lesser known though is final year students' perception and understanding of the role and competencies of health professions that they will interact with, both in the early years after graduation and later in practice. The findings of this study which is across 6 health professions programme will provide broader understanding for encouraging IPC and serves as a baseline for more extensive studies.

The ACTHS instrument was found to be valid and reliable for the context of our study and was comparable to previous reports. Overall findings from our study are congruent with results from previous studies (Hojat et al., 1999; Leipzig et al., 2002), indicating that attitudes towards team working are generally positive among health professional students. There are few possible reasons for the positive scores. It is plausible that the emphasis on the importance of IPC approaches in education has encouraged the positive attitude towards IPC. The university (IMU) since 2012 has initiated efforts to integrate and embed collaborative learning sessions into the undergraduate health professional programmes. Although the delivery method of collaborative learning each programme varies, all programmes have graduate outcomes, which are related to core competencies of IPC within the programme. For example, collaborative learning requires communication skills and teamwork. The student learning outcomes related communication skills and team working are delivered through Problem Based Learning, community service projects and research projects, group presentations and assignments from year 1 to the final year.

As the participants of this study were final-year students who have been exposed to the real clinical practice via experiential learning, it is also possible that the interaction and observation of different level of collaborative practice in primary or secondary care settings could have promoted the positive attitudes towards team working (Lai, Sivalingam, & Ramesh, 2007; Tunstall-Pedoe, Rink, & Hilton, 2003). It has been recognised that the ideal interprofessional clinical learning experience involves students from several disciplines in experiential learning via practice-based settings (Lapkin, Levett-Jones, & Gilligan, 2012). One such learning environment is a "training ward", in which preregistration health professional students work in interprofessional teams, under supervision, to manage the care of patients (Morphet et al., 2014). Successful training ward programmes not only engaged students in interprofessional patient care, but also reported to have positive student and patient outcomes (Hasan et al., 2013; Ericson, Masiello & Bolinder, 2012; Lindblom, Scheja, Torell, Astrand, & Felländer-Tsai, 2007; Tanaka & Yokode, 2005; Freeth et al., 2001).

Studies have highlighted that understanding of one's own and others' professional roles, responsibilities and value in patient care is an important prerequisite for collaboration to occur (Orchard, Curran & Kabene, 2005; Suter et al., 2009). In this study, we evaluated the final-year students' perception and understanding of the roles and competencies of 6 health professions including their own. While the ACTHS findings were positive, the roles and competencies checklist showed mixed findings in that students correctly identified some competencies and had misconceptions for others.

For example, physician is regarded by the majority of students as the competent profession for these responsibilities ranging from 'assessment and evaluation', 'the provision of patient care' and 'medication management'. Although patient assessment is considered as one of the core competencies in undergraduate health professional programmes, it is of concern that less than 50% of participants recognised the importance of assessment of patient's health-illness as a competency for dieticians. The finding indicates that the need to increase awareness of the dieticians' responsibilities in patients' assessment in the curriculum of the respective programmes. A recent study by Darlow et al. (2015), which introduced an IPE initiative across 4 health professional programmes including dieticians, suggests improved attitudes towards interprofessional teams and learning, as well as self-reported ability to function within an interprofessional team, and ability to manage people with long-term conditions. Biomedical scientist and biotechnologist on the other hand is rightly recognised to be competent in performing laboratory investigation. This probably due to unique roles of biomedical scientist/biotechnologist and the lesser opportunities for contact or collaboration the other health professions have with them for direct patient care.

Majority of participants correctly identified physicians as competent or highly competent in prescribing medication while only 67.5 % considered dentist to be competent in prescribing medications. This figure is quite low compared to 84% for pharmacists, who are only authorised to prescribe selected group of medications (mostly over the counter products and non-prescription medication). This perhaps indicates lack of awareness that licensed dentists are also considered legal prescribers for medicines in Malaysia and other countries, similarly to physicians. Another reason could be due to the limited range of dental prescription from general dental practitioners. Dental prescription generally comprises of analgesics and antibiotics (Dar-Odeh, Ryalat, Shayyab, and Abu-Hammad 2008; Mendonca et al., 2010). It is also worth noting that the misconception or lack of understanding of professional roles has been observed for the nursing profession too. Previous studies found that medical students were less clear about competencies important for nursing than nursing students were in their perceptions of competencies important for doctors (Rudland & Mires, 2005; Spence & Weston, 1995). Given that majority of the students in this study are from medicine and pharmacy, attention is needed to close the gap on understanding nurses' roles as both these professions especially physicians will work closely with them in various clinical and community settings. Although the need for IPE to improve knowledge of different healthcare roles has been suggested for more than 20 years, the findings reported in this study and others suggest undergraduate IPE can still be improved at the undergraduate level (Fagin, 1992; McCahan, 1986).

In terms of roles and competencies related to medication, pharmacist was recognised to be the second most competent professional in medication prescribing and adjustment. The finding seems surprising as pharmacists' roles in prescribing in limited to non-prescription medication. Pharmacists have the limited rights to prescribe medication. Nevertheless, there is increasing evidences of expanding roles of pharmacist in medication management. One such example is the introduction of Medication Therapy Adherence Clinic (MTAC) and home medication reviews. In provision of these services, pharmacists' roles include medication review as well as making recommendations on dosage adjustment (Aidit, Shaharuddin, Neoh, & Ming, 2015; Lim & Lim, 2010; Saleem, Hassali, & Chow, 2015). Although not yet a model in Malaysia, the expanded pharmacist prescribing role is also emerging

internationally (Hoti, Hughes, & Sunderland, 2011). In United Kingdom, the movement has led to introduction of supplementary and independent models of prescribing (Cooper et al., 2008).

The gaps or misconception regarding roles and competencies identified amongst the health professional final year students are a cause for reflection on curriculum delivery. Although there is an awareness of the importance of interprofessional curriculum and providing opportunities for students to learn in interprofessional groups, individual programme needs may take priority in curriculum delivery and assessment resulting in challenges for IPE. This includes developing learning outcomes, scheduling teaching learning activities, class size, blue printing of assessments, as well as skill development based on individual health professional roles, competencies and needs. Hence it is possible that the learning environments within the professional groups differ significantly (Pollard, Miers, & Gilchrist, 2005). Furthermore, it has been pointed that if students do not observe IPC being role modelled in practice or have opportunities to engage with other health professions in practice, it will difficult for them to recognize the roles and competencies important for health professionals. Universities and health care institutions should work together to unite the theory and practice, allowing learning to be supported with "real practice" (Jackson et al., 2016).

There are several limitations encountered in this study. Firstly, this study was cross-sectional in design and not longitudinal in nature. Thus, it does not reveal the actual development of interprofessional team working behaviour in the student cohorts. Secondly, the scores reported for roles and competencies were derived from measures obtained with a self-reported instrument which was not supplemented with observational measurements. Therefore, the assessment was of students' orientation to IPP and may not accurately reflect the true learning behaviour and experiences. Thirdly, the finding may somewhat limited in general ability owing to their derivation from only one institution. This study however does provide useful insights on graduating health professionals' perceptions toward IPP as the attitudes toward team working and understanding of the roles and competencies of 6 different health professions was elucidated. Future directions for research should continue with implementing IPE activities with goals on improving understanding on the roles and competencies of health professionals. The long-term effect of these initiatives on interprofessional practice as well as attitudes toward interprofessional teamwork and knowledge of health professionals' roles and competencies should be evaluated.

V. CONCLUSION

Final year health professional students have positive attitudes toward interprofessional team working. However, this study also identified gaps in understanding the roles and competencies of 6 different health professions amongst the final year students. The understanding of one's own and others' professional roles, responsibilities and value in patient care is critical in a collaborative environment. The findings of this study will be helpful in making informed decisions for curriculum design and delivery of IPE programmes. In relation to this study, the gaps identified in final year students' perception of the roles of above mentioned health professionals has been highlighted to the respective programme coordinators for their further action.

Notes on Contributors

Vishna Devi V Nadarajah (VDN), Pei Se Wong (PSW), Syed Shahzad Hasan (SSH), Jinly Ooi (JLO) and Lawrence Hsien Sheng Lim (LL) were involved in conception and design of the work, drafting the research proposal, data analysis and manuscript writing. VDN and PSW were involved in conception and design of work, JLO and LL collected the data, and together with VDN, PSW and SSH contributed on the data analysis and interpretation. PSW, VDN and SSH contributed on critical revision of the article; and writing of final approval of the version to be published.

Ethical Approval

Ethics approval was received from International Medical University, Research and Ethics Joint Committee (Project ID BPI-01-11(50)2014).

Acknowledgements

The authors would like to acknowledge final-year students who had participated in this study. The authors are also thankful to the International Medical University for the study approval and funding.

Declaration of Interest

This study was supported by International Medical University, Kuala Lumpur. Ethics approval was received from International Medical University, Research and Ethics Joint Committee (Project ID BPI-01-11(50)2014). All authors have no potential conflicts of interest.

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