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Title	Learning to swallow together: Medical and speech and language therapy student interprofessional learning about dysphagia
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Publication date	2021-11-09
Original Citation	Kelly, H., Cronin, M., Hynes, H., Duxbury, S. and Twomey, O. (2021) 'Learning to swallow together: Medical and speech and language therapy student interprofessional learning about dysphagia', Advances in Communication and Swallowing, 24(1), pp. 21–32. https://doi.org/10.3233/ACS-210027
Type of publication	Article (peer-reviewed);journal-article
Link to publisher's version	10.3233/acs-210027
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Download date	2026-11-03 09:38:55
Item downloaded from	https://hdl.handle.net/10468/14357



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ABSTRACT

BACKGROUND: Interprofessional education (IPE) is considered to be a necessary step in preparing the healthcare workforce for collaborative patient care. Dysphagia, a complex health condition, requires collaboration between disciplines such as medicine (MED) and speech and language therapy (SLT). Therefore, both disciplines must have a shared understanding of dysphagia management within the context of interprofessional care.

OBJECTIVE: This study investigated MED and SLT students' shared learning about dysphagia management following an IPE workshop. The student experience of IPE was also explored.

METHODS: Fifty students participated in one 3-hour classroom-based IPE dysphagia workshop which was appraised through a questionnaire completed immediately before and following the workshop. Within- and Between-Group analysis evaluated change in knowledge about dysphagia management. Comments related to student learning experiences were examined using a qualitative description approach.

RESULTS: 98% of students (24 MED; 25 SLT) completed pre- and post-workshop questionnaires. Wilcoxon Signed-Rank tests indicated statistically significant post-workshop growth in knowledge about symptoms ($p<.001$) and medical conditions ($p<.001$) related to dysphagia. Students reported increased confidence in their ability to identify dysphagia ($p<.001$). Greater understanding of interprofessional roles was observed post-workshop, notably nursing ($p<.05$), pharmacy ($p<.05$), occupational therapy ($p<.05$) and physiotherapy ($p<.001$). While recognised as beneficial to shared learning and appreciation of different discipline perspectives, both cohorts found IPE challenging.

CONCLUSIONS: Classroom-based IPE is an appropriate approach for shared learning about complex health conditions which require interprofessional care. Including patient-facing activities would further enhance student learning. While students found IPE challenging, they identified several benefits related to their professional development.

Introduction

The value of interprofessional education (IPE) has been recognised by the World Health Organisation in the context of international concerns around fragmented healthcare provision (WHO, 2010). Its "*Framework for Interprofessional Education and Collaboration",* recognises IPE as a "necessary step in preparing a 'collaborative practice-ready' health workforce" required for effective interprofessional healthcare collaboration (WHO, 2010, p.7).

Core IPE competencies have been identified (Interprofessional Education Collaborative Expert Panel, 2011) and a commitment to the inclusion of IPE in healthcare professions (HCP) education standards and programme accreditation is emerging (Azzam, Puvirajah, Girard & Grymonpre, 2021; CORU, 2018; Health and Care Professions Council, 2017). However, core curricula and frameworks are less well defined and a definitive set of learning outcomes applicable across all health professions is needed (O'Keefe, Henderson & Chick, 2017; Steven et al., 2017). Recently, Steven et al. (2017) mapped the outcomes and standards required by five UK HCP regulatory bodies and proposed a framework for use by educators to plan and deliver meaningful IPE: "Knowledge for practice", "Skills for practice", "Patient-centred approach", "Ethical approach to practice", "Continuing professional development", "Team-working", and "Professionalism". Furthermore, O'Keefe et al. (2017) identified eight competency statements related to IPE that every entry-level HCP graduate should meet. Competencies include the ability to explain HCP roles to all involved in patient care, express professional opinions without discipline jargon, resolve patient care disagreements and welcome the exchange of instructive feedback, identify opportunities to involve other HCPs

in goal setting and patient priorities, and critically evaluate interprofessional protocols and practices (O'Keefe et al, 2017).

Several systematic reviews have evaluated the attitudes of healthcare students towards IPE. Berger-Estilita, Fuchs, Hahn, Chiang and Greif (2020) found more than 50% of their included studies demonstrated a significant increase in positive attitudes towards IPE by students following an IPE experience. Findings suggest that following IPE attitudes and perceptions of each other's profession improves (Reeves et al., 2016; Spaulding et al., 2019) with a significant improvement in collaborative knowledge and skills (Reeves et al., 2016) and behaviour (Spaulding et al., 2019). From a healthcare perspective, Reeves et al. (2016) report limited but growing evidence purporting the benefits of IPE to patients. Though more evidence is required, IPE has shown promising results in improving patient health outcomes (Oosterom, Floren, ten Cate & Westerveld, 2019; Shrader, Jernigan, Nazir & Zaudke, 2018) and patient satisfaction (Oosterom et al., 2019).

Educating towards a 'collaborative practice-ready health workforce' is particularly critical for complex health conditions that require an interprofessional approach. Dysphagia (difficulty moving food/fluids from the lips to the stomach) is one such health condition. While difficult to estimate how many people experience dysphagia, it is highly prevalent in three main populations (Clavé and Shaker, 2015): *Neurogenic diseases*, for example, Stroke (Aoki et al, 2016; Martino et al, 2005), Parkinson's Disease (Kalf, de Swart, Bloem & Munneke, 2012; Suttrup & Warnecke, 2016), and Dementia (Ikeda, Brown, Holland, Fukuhara & Hodges, 2002), *Head-and-Neck cancer* (Frowen, Hughes & Skeat, 2020), and the *elderly* (Baijens et al., 2016; Cabre et al., 2010). Poorly managed dysphagia can result in patient health

deterioration, extended hospital stays, poor quality of life, aspiration pneumonia and death (Baijens et al., 2016; Clavé and Shaker, 2015).

Dysphagia is not a distinct medical speciality and therefore requires the expertise of several HCPs, such as, Otorhinolaryngologists, SLTs and other medical specialists to take an interprofessional management approach (Clavé & Shaker, 2015; Farpour et al., 2019). Dysphagia-related health outcomes are thought to improve with effective interprofessional involvement (Aoki et al., 2016; Middleton et al., 2011; WHO, 2010). However, HCP knowledge about dysphagia is inconsistent and sometimes lacking (Anderle, Rech, Pasqualeto & de Goulart, 2018; Farpour et al., 2019). Therefore, to optimise patient care, it is essential that HCPs have sufficient understanding of dysphagia and awareness of other HCPs involved in its management.

Two core professions involved in dysphagia management include medical doctors (MED) and speech and language therapists (SLT). However, while SLTs graduate with a proficiency in dysphagia management, dysphagia is often limited or omitted from medical curricula (Clavé & Shaker, 2015). Several studies have explored IPE with MED and other HCP students, for example, dietetics (Nisbet, Hendry, Rolls & Field, 2008; Shrader et al., 2018), nursing (Burford et al., 2020; Shrader et al., 2018), occupational therapy (Nasir, Goldie, Little, Banerjee & Reeves, 2017; Shrader et al., 2018), pharmacy (Shrader et al., 2018; Wheeler, Valentino, Liston, Li & McAuley, 2019), and SLT (Nasir et al., 2017; Nisbet et al., 2008). While IPE experiences have been explored, to our knowledge, none have included the assessment of shared learning about a health condition which requires interprofessional management by both disciplines once qualified. Endeavouring to align with recommended IPE framework

(Steven et al., 2017) and competencies (O'Keefe et al., 2017), this bi-disciplinary workshop aspired to provide the opportunity for shared learning about dysphagia management, facilitate an appreciation and understanding of each discipline's expertise, and equip students to work effectively within interprofessional teams when qualified. The aims of this study were therefore to investigate the shared learning of MED and SLT students about dysphagia and the roles of HCPs involved in its management, following an IPE workshop. The advantages, benefits, and challenges of IPE from the student perspective were also explored.

Methods

Participants

This study employed a pre-post, mixed-methods, quasi-experimental design to explore the learning of undergraduate SLTs (entering their penultimate year) and undergraduate/ graduate entry MEDs (entering their final year), following participation in one of two identical 3-hour dysphagia-focussed IPE workshops. These cohorts were selected as examination of both curricula indicated closely aligned dysphagia knowledge. Prior to the workshop, students had received uniprofessional introductory education related to the anatomy and physiology of the swallow and attended various clinical placements, though none focussed on dysphagia management. Students were randomly assigned to one workshop and then to small groups comprising 4-5 students, with at least two students from each discipline. Students were permitted to attend (compulsory for SLTs only) even if they chose not to participate in the research. Of the 58 students who were scheduled to attend the workshop, 50 students (25 SLT and 25 MED) attended.

Ethical Considerations

Ethical approval was sought and approved through the University's Social Research Ethics Committee and Research & Postgraduate Affairs Committee.

IPE Workshops

The workshops were classroom-based, each facilitated by an SLT who was clinically experienced in dysphagia management and skilled in workshop facilitation. Workshop content development was led by author MC (SLT) alongside discussions with authors HK (SLT) and HH (MED), so workshops were tailored to both cohort's educational needs. Influenced by the principles of Universal Design for Learning (Rose, Harbour, Johnston, Daley & Abarbanell, 2006) and Entry Points to Learning (Gardner, 1991), student learning was maximised through active engagement, and teaching methods combined didactic, case-based discussions and practical group activities. The workshop was organised into four parts. Learning was guided through discussion about causes, presentation, and management of dysphagia, interprofessional roles, ethical considerations, and discussion of real and simulated patient cases. Small group activities and discussions helped to illuminate, exchange, and consolidate knowledge which was shared with the main class. With the exception of patient-facing interaction, the content, learning methods (Appendix 1), and anticipated learning outcomes aligned with recommended IPE framework (Steven et al., 2017) and learning competencies (O'Keefe et al., 2017) (Table 1). Participating students signed a confidentiality document agreeing not to discuss or retain patient-related information beyond the workshop.

INSERT TABLE 1 HERE

Workshop Evaluation

This study was evaluated through anonymised paper-based pre- and post-workshop number matched questionnaires. Students were given the questionnaire pairs and allocated time for completion during the workshop. With permission, Anderle et al.'s (2018) questionnaire was adapted and piloted in our previous study with medical students (Kelly et al., unpublished). We further adapted it for this IPE study (Appendix 2). The pre-workshop questionnaire comprised 15 multiple choice, Likert scale and free text questions, which explored the knowledge, previous education, clinical experience, and confidence concerning dysphagia. The post-workshop questionnaire comprised 16 questions to evaluate change in dysphagia knowledge, and gathered opinions on the benefits, advantages, and challenges of IPE as experienced by the students. Students placed completed or blank (if they did not wish to participate) questionnaires in a box when leaving the classroom.

Data analysis

A guide was developed by authors MC and HK indicating acceptable responses to questionnaire questions 10 (signs of dysphagia) and 12 (role of professionals). Data entry and statistical analyses were carried out by authors SD and OT who were not involved in the study design or training. Analyses were independently checked for accuracy by author HK. Questionnaire responses were entered into IBM SPSS Statistics for Windows, Version 27 for analysis. Descriptive statistical analyses were carried out to summarise the data and facilitate data interpretation. Data were mainly nominal and ordinal scales with a relatively small sample size. Therefore, inferential statistical analysis of the data included non-parametric measures of Wilcoxon Signed-Rank test for Repeated Measures to compare the means across variables pre- and post-workshop. A p-value of .05 was considered significant in pre-post

(one-tail) and between MED-SLT cohorts (two-tail). Any significant results found were further analysed using post-hoc tests (Mann-Whitney U-test) with Bonferroni adjustment to determine any differences between MEDs and SLTs. Spearman's rank-order correlation was carried out to determine the relationship between correct and incorrect answers for dysphagia symptoms and medical conditions. Responses to the comments sections of the questionnaires were transcribed by SD and OT and entered into an Excel sheet. As the dataset primarily comprised one sentence responses, we took a qualitative descriptive approach which according to Sandelowski (2000, p.339) is the "method of choice when straight descriptions of phenomena are desired". SD, OT and HK independently read the responses and undertook content analysis of the data by systematically applying codes, which were then further analysed. The codes were tagged by discipline to allow examination of any differences in experiences between the cohorts. Themes were identified based on the codes that occurred more commonly throughout the data and were agreed with the research team.

Results

Fifty students attended the IPE workshops and 49 (25 SLT: all female: 24 MED:14 female) completed pre- and post-workshop questionnaires (98% response rate).

Pre-workshop experience of dysphagia

Pre-workshop, 26/49 students (2/24 MED; 24/25 SLT) reported having previous dysphagia education; 21 students provided details about the nature of education received. SLTs detailed academic education, including lectures and Problem Based Learning (n=15); 1st year workshops (n=6) and videofluoroscopy swallow observations (n=4), and some listed specific

topics (n=4). One third of participants (10 MED; 6 SLT) had encountered a patient with dysphagia during clinical placement.

Knowledge about dysphagia

Both cohorts scored highly in identifying the correct sequence of swallowing, dysphagia definition and complications of dysphagia (Table 2). Wilcoxon Signed-Rank tests indicated statistically significant differences between pre- and post-workshop knowledge for the identification of all potential dysphagia symptoms ($z=4.624$, $p<.001$) and all medical conditions that could cause dysphagia ($z=3.247$, $p<.001$). Post-hoc analysis found no significant difference in knowledge between cohorts ($p>.025$). As students could potentially select every correct and incorrect response (Table 2) a Spearman's rank-order correlation was run to determine the relationship between correct and incorrect answers for dysphagia symptoms and medical conditions. There was a weak positive correlation between correct and incorrect dysphagia symptoms pre-workshop only, which was statistically significant ($r_s(47) = .340$, $p=0.17$). No other associations were found.

INSERT TABLE 2 HERE

Students listed signs of dysphagia which we classified into oral preparatory/oral, pharyngeal, and oesophageal swallow phases, and other clinical signs independent of swallow phases, for example, eye tearing or recurrent chest infections. The most reported signs of dysphagia were at the pharyngeal phase for both cohorts pre- (n=22 MED; 41 SLT) and post-workshop (n=28 MED; 39 SLT). Other clinical signs reported pre- (n=19 MED; 12 SLT) and post-workshop (n=25 MED; 23 SLT) were statistically significant between workshops ($z=2.621$, $p=.009$) but not

between-groups. Fewer oral phase signs were reported pre- (n= 1 MED; 7 SLT) and post-workshop (n=4 MED; 4 SLT). One MED noted an oesophageal phase sign post-workshop. Incorrect signs were indicated by pre- (n=15 MED; 9 SLT) and post-workshop (n=9 MED; 10 SLT), with 'I don't know/no response' pre- (n=11 MED; 3 SLT) reducing post-workshop (n=7 MED; 1 SLT). A statistically significant difference was identified between pre- (n=9 MED; 5 SLT) and post-workshop (19, MED; 20, SLT) knowledge about appropriate medication administration ($z=4.811$, $p<.001$) but no difference between-groups.

Students rated their confidence in identifying dysphagia. The mean rating pre-workshop was $\bar{x}=5.08$ ($SD=1.644$). When asked what would further increase their confidence, both cohorts (n=19 MED; 22 SLT) provided suggestions. The most highly identified need was for education (n=15/19 MED; SLT 13/22), with SLTs in particular highlighting a desire for practical patient experience (n=3 MED; 13 SLT). Two MEDs noted needing more interactions with SLTs. Wilcoxon Signed-Rank tests identified a statistically significant increase in confidence rating post-workshop ($\bar{x}=7.65$ ($SD=1.393$)) ($z=6.014$, $p<.001$). Post-hoc analysis revealed no significant difference between the cohorts. The main educational need highlighted by both cohorts (n=13 MED; 19 SLT) post-workshop was for practical patient experience (n=12 MED; 15 SLT). One SLT indicated the need for further education and two reported feeling more confident following the workshop. As with pre-workshop, 2 MED students noted that more interactions with SLTs would further increase their confidence.

Knowledge about interprofessional roles in dysphagia management

Most students (n= 42/49) identified SLT as the main profession responsible for dysphagia management pre-workshop which slightly increased post-workshop (n= 47/49) (Table 3). There was no significant difference between workshops or the two cohorts (p>.05).

Students rated the relevance of dysphagia to their own clinical practice. Wilcoxon Signed-Rank tests revealed a statistically significant difference between pre- ($\bar{x}$ 8.82(1.481)), and post-workshop ($\bar{x}$ 9.12 (SD=1.269)) (z=1.977, p=.025). Post-hoc analysis found a significant difference between the cohorts pre- (U=113.5, z=4.008, p>.001) and post-workshop (U183, z=2.686, p=.004) with SLTs recognising greater relevance than MEDs pre- and post-workshops. Students provided rationales for their ratings pre- (n=19/24 MED; 20/25 SLT) and post-workshop (n=10/24 MED; 16/25 SLT). The most prominent rationales related to (i) anticipated professional roles pre-workshop (n=11 MED; 16 SLT) and post-workshop (n=3 MED: 11 SLT), followed by (ii) medical conditions, complications and impact pre-workshop (n=6 MED; 2 SLT) and post-workshop (n=8 MED), (iii) part of curriculum pre-workshop (n=3 SLT), (iv) effect on patient quality of life (n=2 MED; 1 SLT) post-workshop and (v) one MED stated pre-workshop that it had 'limited impact' on their clinical role.

INSERT TABLE 3 HERE

Students described the main roles of nine HCPs in dysphagia management (Table 3). Responses were classified into 'dysphagia role', 'extended role' (more general patient care), 'incorrect roles' and 'no response'. Wilcoxon Signed-Rank tests revealed a statistically significant difference between pre- and post-workshops for dysphagia management roles of

nursing (z=2.111, p=.033), pharmacy (z=2.041, p=.032), occupational therapy (z=2.524, p=.01) and physiotherapy (z=3.962, p<.001). Post-hoc analysis highlighted that pre-workshop MEDs were significantly more knowledgeable than SLTs about the pharmacy role (U=173, z=3.041, p=.002). There was no between-group differences post-workshop.

Student IPE Experiences

Students rated how beneficial they found the IPE experience ($\bar{x}$=7.86 (SD=2.179)). Mann-Whitney U-test found no statistical difference between SLT and MED ratings (p=.305). Three common themes emerged from the qualitative descriptive analysis of student comments (16/24 MED: 18/25 SLT) (Table 4). The first theme '*Learning'* provided insight into mixed feelings regarding the information covered in the workshops. Some students reported having prior knowledge of some material, with one SLT commenting that it was "*a lot of revision for SLT students*". Others identified new areas of learning – "*helped explain cause & diagnosis of dysphagia & treatment options, practical information"*. Another theme highlighted the '*Communicative Exchange'* between the students which was positive overall. Students reported beneficial learning from "*getting other perspectives"* in relation to patient care. The final theme '*Interdisciplinary Role'* highlighted student learning about each other's role in dysphagia management. Students commented that they "*learned a lot about what SLTs do"* and "*realis[ed] the needs for information of other professionals*".

INSERT TABLE 4 HERE

Challenges and Advantages of IPE

Students documented challenges and advantages of IPE. Five common themes highlighted challenges experienced during IPE (n=18/24 MED; 17/25 SLT) (Table 5). The first theme '*Prior Knowledge'* emphasised that "*different knowledge levels"* pre-workshop was considered challenging (6/18 MED; 8/17 SLT). Despite the inclusion of icebreakers and small group tasks, '*Group Familiarity'* was noted to be a challenge of IPE by both cohorts (7/18 MED; 4/17 SLT) with several students stating that "*meeting new people"* and "*getting to know others"* was challenging. The theme of '*Communicative Exchange'* was identified as students (11/18 MED; 8/17 SLT) reported struggling with conflicting opinions and perspectives. For instance, students reported "*clashing points of view"* and that "*open discussion is difficult*". This negative perception extended to '*Patient Care'* where some students (4/18 MED; 6/17 SLT) believed there were "*differing priorities for the patient"* between disciplines. A lack of understanding about '*Interdisciplinary Roles'* was highlighted as challenging (3/18 MED; 8/17 SLT) with students commenting that "*understanding a new discipline"* was difficult. Several MEDs (6/18) commented that the timing of the workshop was burdensome "*take[ing] up a lot of time in final year"*.

INSERT TABLE 5 HERE

Five themes were identified as advantages of IPE (24 MED; 22 SLT) (Table 6). The first theme '*Knowledge*' (14/24 MED; 6/22 SLT) highlighted the benefits of "*sharing knowledge*" noting that the disciplines were "*knowledgeable in different areas*". While the theme of '*Communicative Exchange'* was previously noted to be a challenge, students (14/24 MED; 16/22 SLT) noted benefits of "*exchang[ing] ideas*" and "*acknowledging different perspectives*". The advantage of IPE for '*Patient Care'* was identified with both cohorts (7/24

MED; 8/22 SLT) remarking that IPE "*aids holistic care*" with "*real world application"*. '*Team-Work'* was another identified theme where students highlighted that IPE fosters teamworking by "*build[ing] rapport with other specialties*" and "*encourag[ing] cooperation*". The final theme '*Interdisciplinary Roles'* identified by both cohorts (18/24 MED; 14/22 SLT) highlighted the importance of "*learning about [the] role of another speciality*" as being an advantage of IPE.

INSERT TABLE 6 HERE

Discussion

IPE is essential for the awakening of healthcare students to the need for collaborative working to enhance patient care (WHO, 2010). Studies have demonstrated a positive attitude by students towards IPE (Berger-Estilita et al., 2020) with some evidence for enhanced patient health outcomes (Oosterom et al, 2019; Shrader et al., 2018). Our study explored MED and SLT student perspectives about their experience following one 3-hour classroom-based IPE workshop that focussed on a complex health condition that both disciplines would manage collaboratively when qualified. Notably, we assessed knowledge acquired from this shared learning which largely aligned with recommended IPE framework (Steven et al., 2017) and learning competencies (O'Keefe et al., 2017).

Knowledge and Confidence around Dysphagia Management

The education intervention had a significant positive effect on the learning of both student cohorts. Prior to the workshop, most students understood the correct swallow phases and definition of dysphagia. However, knowledge pertaining to the symptoms and medical causes of dysphagia, and medication administration showed statistically significant improvement

following active shared learning, for both cohorts. Importantly, students reported having more confidence in identifying a patient with dysphagia following the workshop. While most students recognised the SLT as primarily responsible for dysphagia management, knowledge regarding the roles of other HCPs involved in dysphagia care increased significantly post-workshop, in particular nursing, occupational therapy, pharmacy, and physiotherapy. While SLTs rated the relevance of dysphagia more highly than MEDs, there was a significant positive shift in acknowledging its relevance to clinical practice post-workshop by both cohorts. This fostered important professional awareness given that a team approach to dysphagia management is considered optimal for positive patient outcomes (Aoki et al, 2016; Clavé & Shaker,2015; Middleton et al., 2011).

Student Experience of IPE

Both cohorts rated their IPE experience overall as beneficial and highlighted advantages in relation to the acquisition and sharing of knowledge. Even so, student comments sometimes appeared contradictory. There was a sense of them wrestling with the challenges of IPE while simultaneously appreciating its benefits. While students welcomed the opportunity to hear the perspectives of the other discipline, they found it challenging to negotiate conflicting opinions and manage the communicative exchange, with one MED asking, “Who captains the ship”? Perhaps this is part of the essential growing process, shifting beyond what Eichorn et al. (2020) term as the ‘uniprofessional lens’ and broadening their understanding and appreciation of their future clinical selves within an interprofessional team. This shift can be challenging for students who, according to Vuurberg, Vos, Christoph and de Vos (2019, p.158), may have previously engaged in a “socialisation process and mono-disciplinary learning experiences [that] enforce professional boundaries and silos”. This raises the complex

question regarding the timing of IPE in healthcare curricula. On one hand, students must acquire specialist knowledge about their discipline and develop their own professional identity, whilst also learning how to work collaboratively with other disciplines. There is no clear-cut solution as various dynamics need consideration, such as age, mature students versus school leavers, prior knowledge, and previous teamwork experience (Anderson & Thorpe, 2008).

According to Reeves et al. (2016) for effective learning, IPE should ideally be carried out in a context that reflects the students' future practice. Cox, Cuff, Brandt, Reeves and Zierler (2016) also raise concerns that most IPE is classroom-based and recommends that to align IPE and healthcare services, IPE should relocate to clinical environments and include the patient, family, and caregiver experiences. However, our study and others (Anderson et al., 2011; Morison, Boohan, Jenkins & Moutray, 2003; Vuurberg et al., 2019) have demonstrated positive outcomes from classroom-based learning. Our classroom-based IPE workshop provided opportunities for teamwork activities and shared learning about a complex health condition. As our materials included real and simulated patient data with corresponding authentic ethical challenges, students were exposed to experiences requiring conflict resolution in interprofessional groups. Additionally, substantial clinically relevant knowledge acquisition is evidence of the value of IPE in an educational setting. However, our students emphasised the need for hands-on dysphagia-focussed clinical practice and considered it fundamental to improving their confidence in dysphagia management. Morison et al. (2003) report student preference for combining classroom and ward-based learning, considered particularly effective for supporting students to feel part of a clinical team. Anderson et al. (2011) found that IPE in clinical settings had a greater impact on student learning than

classroom-based alone. Bringing IPE to the patients, or the patients to the classroom would further enhance clinical learning, where students can experience teamwork in action. This patient-facing interaction could also facilitate meeting relevant patient-related IPE learning competencies (O'Keefe et al., 2017).

Limitations and Future Research

Questionnaire comments provided several insights into student IPE experiences. Some students reported a negative impact on discussions due to different prior knowledge around dysphagia. Future IPE could take a flipped-classroom approach where students would view cross-disciplinary learning materials to ensure an equitable knowledge base before IPE engagement. We erroneously assumed that student experience in working effectively in within-discipline groups would automatically transfer to cross-disciplinary learning. Machin et al. (2019) note student groups commonly feel anxious about revealing their potential lack of knowledge in IPE. Our findings concur, suggesting the need for preparatory support regarding expectations to reduce vulnerability when sharing knowledge with other disciplines. Reflective of the learning approach at our teaching hospital and university, students learn about dysphagia management from clinically experienced SLTs. However, Morison et al. (2003) found their students relied on faculty from their own discipline for encouragement in engaging with IPE. Therefore, students may benefit from having workshop facilitators from each discipline, modelling interprofessional collaboration in their teaching (Anderson et al., 2011). Finally, though potentially logistically challenging (Barrett, Greenwood & Ross, 2003), future IPE could expand the range of disciplines included, for example, dietetics, pharmacy, and other HCPs, thus providing learning opportunities more reflective of interprofessional discussions of complex dysphagia cases. This would provide a

larger sample size but importantly better prepare healthcare students to become a 'collaborative practice-ready' workforce (WHO, 2010).

Conclusion

The management of dysphagia, a complex and pervasive health condition, requires interprofessional collaboration to enhance patient health outcomes, therefore HCPs should be educated at undergraduate level in preparation for collaborative patient care. Our study uniquely demonstrated that one 3-hour classroom-based IPE workshop increased student knowledge about dysphagia and fostered an appreciation of the importance of interprofessional team roles. IPE as a teaching method was valued by students which challenged them in ways that uniprofessional education could not, for instance, cross-disciplinary patient case discussions. The inclusion of patient-facing clinical activities would provide further valuable insight into interdisciplinary collaboration and develop more confidence in working with this health condition.

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Appendix 1 – Workshop content with Reflections

Part 1	
Introductions	As the focus of the workshop was on IPE and developing communication between the two student groups the workshop started with an icebreaker activity to encourage students to introduce and share information about themselves. This was immediately followed by an experiential swallowing activity with small group discussion.
The Normal Swallow	Theoretical information relating to the anatomy and physiology of normal swallowing including, Cranial Nerves and Phases of Swallow was presented through a PowerPoint presentation and illustrated with videoclips.
Part 2 **Dysphagia**	Theoretical information relating to dysphagia was presented through a PowerPoint presentation and illustrated with patient videos and clinical data. Students were encouraged to ask questions and to share their own experiences of working with dysphagia. Clinical signs/symptoms, consequences and underlying conditions related to dysphagia were discussed. To consolidate the information each group designed a referral card using information from a patient video. The aim was to identify the information required from the perspective of MED and SLT students to facilitate appropriate referral for a patient with dysphagia.
Part 3 **Management**	Management of dysphagia focused on modified consistencies and its role in dysphagia management, and the impact on medication administration. Students engaged in an experiential activity where they sampled modified consistently fluids and discussed their impressions of this within the main group both from a personal experience and within the context of quality of life for patients who are recommended a modified consistency diet.
Part 4 **Interdisciplinary Role roles & Ethical Issues**	Discussion on ethical issues related to patient quality of life, informed consent and end of life care was facilitated through an activity where students had to devise a management plan for simulated patients with complex medical needs, including terminal diagnosis, intellectual disability, and severe dysphagia. The aim of this

activity was to develop decision making within an interdisciplinary team where there was not a clear pathway of care within the context of a complicated patient case history and challenged the students to communicate and negotiate using their professional knowledge base. For this task students had to consider the roles of various interdisciplinary professionals in the care of these stimulated patients.

Facilitator Reflection

Part 3 *activities facilitated movement within the large group and encouraged personal and qualitative feedback which resulted in a lively discussion and better communication within the smaller groups probably related to the fact that this activity was not related to prior knowledge and did not evaluate skills, so students were more confident in giving feedback.*

The strength of the activity in ***Part 4*** *was that it was patient focussed which resulted in more investment in the activity and because of the difficulty of the case there was not necessarily one correct outcome which facilitated discussion between the student groups from each of their clinical perspectives. It would be beneficial to introduce this type of activity earlier on in the workshop as the patient related problem solving in generated better communication within the small groups.*

Appendix 2 Questionnaire *(Q8 &14=pre-workshop only; Q16-18=post-workshop only)*

1 Sex: Female ( ) Male ( )

2 Indicate by ticking the box if you are a
   a. Medical Student ( )
   b. Speech and Language Therapy Student ( )

3 What is the correct sequence of the phases of swallowing?
( ) Oral, oral preparatory, pharyngeal, esophageal
( ) Oral, oral preparatory, esophageal, pharyngeal
( ) Oral preparatory, oral, pharyngeal, esophageal
( ) Oral preparatory, oral, esophageal, pharyngeal
( ) I do not know

4 What is dysphagia? *(please select <u>one</u>)*
( ) Difficulty in transporting food from the mouth to the stomach
( ) Symptom of a disease of the digestive tract
( ) Pain in the digestive tract
( ) I do not know

5 What are some of the complications of dysphagia? *(please select <u>one</u>)*
( ) Malnutrition, dehydration, increased sensitivity of the larynx
( ) Dehydration, malnutrition, aspiration
( ) Malnutrition, aspiration, increased sensitivity of the larynx
( ) I do not know

6 Which of the following symptoms could patients with dysphagia present with? *(please select all relevant symptoms)*
( ) Loss of saliva/food from mouth ( ) Oral Thrush
( ) Difficulty chewing ( ) Chronic cough
( ) Nasal reflux ( ) Absent gag reflex
( ) Difficulty starting a swallow ( ) Choking
( ) Increased feeding time ( ) Loss of appetite
( ) Alteration in vocal quality e.g. wet voice
( ) Indigestion ( ) Breathlessness on exertion e.g. walking
( ) Frequent chest infections

7 Which of the following medical conditions can <u>cause</u> dysphagia?
( ) Parkinson's Disease ( ) Inflammatory bowel disease
( ) Stroke ( ) Head and Neck Cancer
( ) Sinusitis ( ) Hypothyroidism
( ) Diabetes ( ) Cerebral Palsy
( ) Crohn's disease ( ) Motor Neurone Disease
( ) Dyslexia ( ) Multiple Sclerosis
( ) Traumatic Brain Injury ( ) Dementia

8 Have you received guidance/education that focusses on the assessment and management of patients with dysphagia? [PRE-WORKSHOP ONLY]
( ) Yes
( ) No
If yes, briefly describe _____

9 How would you rate your confidence in identifying dysphagia in a patient? *(indicate on the scale below where 10 is fully confident and 0 is no confidence at all.)*



What would help increase your confidence further?
_____

10 List three signs of dysphagia that would lead you to refer a patient for an Eating, Drinking and Swallowing assessment
   (1) _____
   (2) _____
   (3) _____
   (4) I do not know ( )

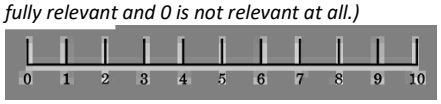
11 How would you administer medication in a patient with dysphagia? *(please select <u>one</u>)*
( ) Cut the medication and offer water
( ) Crush/smash the medication and mix it with yoghurt
( ) Dissolve it with liquid
( ) Seek Pharmacy referral
( ) Other (describe) _____
( ) I do not know

12 What is the main role of the following Professionals in the management of dysphagia? *(briefly list main role for each one. If you don't know write 'DK')*
( ) Dietitian _____
( ) Nurse _____
( ) GP _____
( ) Occupational Therapist _____
( ) Pharmacist _____
( ) Physician _____
( ) Physiotherapist _____
( ) Radiologist _____
( ) Speech & Language Therapist _____

13 Which ONE professional is mainly responsible for assessing and rehabilitating patients with dysphagia? *(please select one)*
( ) Dietitian ( ) Nurse
( ) GP ( ) Occupational Therapist
( ) Pharmacist ( ) Physician
( ) Physiotherapist ( ) Radiologist
( ) Speech & Language Therapist ( ) I do not know

14 Have you encountered a patient presenting with dysphagia during your clinical placement(s)?
( ) Yes
( ) No
If yes, briefly describe how you managed this patient
_____

15 How relevant do you believe dysphagia knowledge is relation to your clinical practice? *(indicate on the scale below where 10 is fully relevant and 0 is not relevant at all.)*



Please comment on the reason behind your score above
_____

16 How beneficial did you find Inter-Professional learning about dysphagia? *(indicate on the scale below where 10 is fully beneficial and 0 is not beneficial at all.)* [POST-WORKSHOP ONLY]



Please comment on the reason behind your score above
_____

17 List three advantages of Inter-Professional learning [POST-WORKSHOP ONLY]
   (1) _____
   (2) _____
   (3) _____

18 List three challenges of Inter-Professional learning [POST-WORKSHOP ONLY]
   (1) _____
   (2) _____
   (3) _____

19 Any other comments? _____

Table 1 Workshop Outcome Areas aligned with IPE Framework (Steven et al., 2017) and Learning Competencies (O'Keefe et al., 2017)

Steven et al. (2017)	Workshop Outcome Areas	O'Keefe et al. (2017)
Knowledge for Practice	Theoretical information related to swallowing and dysphagia Discussion around clinical presentations of dysphagia Recognising the need for a shared knowledge base	Describe the areas of practice of other health professions
Skills for practice	Multidisciplinary discussion around formulating client management plans Creating clinical products (for example, referral card, thickening fluids)	Identify opportunities to enhance the care of patients/clients through the involvement of other health professionals
Patient-centred approach	Use of patient videos and case histories to support activities Consideration of patient quality of life in through specific workshop activities	Plan patient/client care goals and priorities with involvement of other health professionals
Team-working	Creating outcomes that supported patient quality of life, taking into account differing professional perspectives Communicating effectively and negotiating appropriate pathways of care taking into consideration different professional perspectives	Recognise and resolve disagreements in relation to patient care that arise from different disciplinary perspectives Give timely, sensitive, instructive feedback to colleagues from other professions, and respond respectfully to feedback from these colleagues
Professionalism	Working with in a respectful way to negotiate patient outcomes that reflect both professions' perspectives Presenting information in a format that is accessible to all parties to facilitate informed decision making	Express professional opinions, competently, confidently, and respectfully avoiding discipline specific language
Ethical approach to practice	Maintaining Confidentiality Ethical decision making within the context of patient information	Recognise and resolve disagreements in relation to patient care that arise from different disciplinary perspectives
Continuing professional development	Evidence based approach to clinical decision making taking into account the knowledge base of each profession.	Explain interprofessional practice to patients, client's families and other professionals *(other professionals only)* Critically evaluate protocols and practices in relation to interprofessional practice *(practices only)*

Table 2 - Knowledge about dysphagia

	MEDs (n=24)		SLTs (n=25)	
	Pre-workshop	**Post-workshop**	**Pre-workshop**	**Post-workshop**
Correct sequence of swallow	21 (87.5%)	21 (87.5%)	23 (92%)	25 (100%)
Definition of Dysphagia	23 (95.8%)	24 (100%)	25 (100%)	25 (100%)
Complications of Dysphagia	21 (87.5%)	23 (95.8%)	17 (68%)	20 (80%)
Symptoms of Dysphagia				
- Identified all 8 symptoms*	5 (21%)	18 (75%)	11 (44%)	20 (80%)
- Incorrect				
- 0	2	0	0	1
- 1-2	7	1	14	5
- 3-4	10	16	9	14
- 5-6	5	7	2	5
Conditions causing dysphagia				
- Identified all 8 conditions*	14 (62.5%)	19 (79.2%)	13 (52%)	19 (76%)
- Incorrect *				
- 0	12	14	21	18
- 1-2	10	7	4	6
- 3-4	2	2	0	0
- 5-6	0	1	0	1
Identified signs of dysphagia				
- Oral Preparatory/Oral	1	4	7	4
- Pharyngeal	22	28	41	39
- Oesophageal	0	1	0	0
- Other Clinical Signs*	19	25	12	23
- Incorrect/DK or NR	15/11	9/7	9/3	10/1
Medication and dysphagia*	9 (37.5%)	19 (79.2%)	5 (20%)	20 (80%)

*statistically significant; DK 'don't know'; NR 'no response'

Table 3 – Interdisciplinary Roles in Dysphagia Management

	MEDs (n=24)		SLTs (n=25)	
	Pre-workshop	**Post-workshop**	**Pre-workshop**	**Post-workshop**
Clinical relevance of dysphagia	$\bar{x}$ 8 (1.615) Range 4-10	$\bar{x}$ 8.71 (1.268) Range 6-10	$\bar{x}$ 9.6 (.764) Range 8-10	$\bar{x}$ 9.52 (1.159) Range 5-10
Main professional responsible for dysphagia management	18 (75%)	22 (91.7%)	24 (96%)	25 (100%)
Dietitian				
- **Dysphagia role**	**20 (83.3%)**	**23 (95.8%)**	**22 (88%)**	**23 (92%)**
- Extended	0	0	0	0
- Incorrect/NR	3/1	1/0	3/0	0/2
GP				
- **Dysphagia role**	**18 (75%)**	**20 (83.3%)**	**18 (72%)**	**22 (88%)**
- Extended	0	2	1	0
- Incorrect/NR	1/5	0/2	1/5	1/2
Nurse*				
- **Dysphagia role**	**19 (79.2%)**	**21 (87.5%)**	**16 (64%)**	**21 (84%)**
- Extended	1	1	1	1
- Incorrect/NR	1/3	1/1	1/7	1/2
Occupational Therapist *				
- **Dysphagia role**	**12 (50%)**	**19 (79.2%)**	**19 (76%)**	**23 (92%)**
- Extended	2	1	0	0
- Incorrect/NR	0/10	3/1	0/6	0/2
Pharmacist *				
- **Dysphagia role**	**14 (58.3%)**	**14 (58.3%)**	**4 (16%)**	**15 (60%)**
- Extended	6	9	14	8
- Incorrect/NR	0/4	0/1	0/7	0/2
Physician				

- **Dysphagia role**	**12 (50%)**	**12 (50%)**	**2 (8%)**	**0**
- Extended	2	4	5	3
- Incorrect/NR	3/7	6/2	2/16	12/10
Physiotherapist *				
- **Dysphagia role**	**8 (33.3%)**	**17 (70.9%)**	**2 (8%)**	**12 (48%)**
- Extended	1	4	10	7
- Incorrect/NR	6/9	3/0	3/10	3/3
Radiologist				
- **Dysphagia role**	**16 (66.7%)**	**21 (87.5%)**	**23 (96%)**	**23 (92%)**
- Extended	1	0	0	0
- Incorrect/NR	3/4	3/0	1/1	0/2
Speech and Language Therapist				
- **Dysphagia role**	**18 (75%)**	**23 (95.8%)**	**25 (100%)**	**23 (92%)**
- Extended	2	1	0	0
- Incorrect/NR	1/3	0/0	0/0	0/2

*statistically significant; NR- no response

Table 4 How beneficial students found IPE

Theme identified	Illustration of theme
Learning	"didn't know previously about different types of fluids, DOSS score" (MED) "this was a fantastic learning opportunity" (SLT) "though we had most of the information already it was a good refresher" (SLT)
Communicative Exchange	"good being with med students; good to hear their side" (SLT) "talking in a group setting is v. beneficial" (MED) "we learned from each other" (SLT)
Interdisciplinary Role	"was good to get an understanding of the role of the SLT" (MED) "important to link in with other fields as everyone plays an important role in dysphagia management" (SLT) "realising the needs for information of other professionals" (SLT)

Table 5 Challenges of IPE

Theme identified	Illustration of theme
Prior Knowledge	"different knowledge levels' (MED)
	"different levels of knowledge before workshop" (SLT)
Group Familiarity	"intimidating" (SLT)
	"lack of familiarity" (SLT)
	"not knowing each other" (MED)
Communicative	"differences of opinion on ethical issues" (MED)
Exchange	"not understanding each other" (SLT)
Patient Care	"conflicting priorities for patient" (SLT)
	"too many procedures may mishandle patient management" (MED)
	"not always going to be able to do what you think is best different recommendations" (SLT)
	"different goals/ interests" (MED)
Interdisciplinary Role	"understanding a new discipline" (MED)
	"lack of professional understanding" (SLT)

Table 6 Advantages of IPE

Theme identified	Illustration of theme
Knowledge	"learn about another medical field" (MED)
	"learning from each other - all are knowledgeable in different areas" (SLT)
Communicative Exchange	"get to see things from other perspectives" (SLT)
	"seeing things from a different point of view" (MED)
	"broader outlook" (SLT)
Patient Care	"having different perspectives to add to patient care" (MED)
	"get different perspectives on clinical issues" (MED)
	"holistic client -view" (SLT)
Team-Work	"learn how to work together" (SLT)
	"learning to work together as a team" (MED)
	"get to know other members of your team" (SLT)
Interdisciplinary Role	"knowledge on what other's roles are" (SLT)
	"more aware of MDT work on dysphagia" (MED)
	"the importance of the MDT" (SLT)