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Preparing pharmacy students to communicate effectively with adolescents

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Abstract:

Objectives. Develop an elective workshop designed to equip pharmacy students with skills to effectively communicate with adolescents. To conduct preliminary evaluation of the workshop to assess its impact on pharmacy student perceived confidence and knowledge relating to the importance of adolescent counseling and counseling techniques.
Methods. Academics from three universities in three countries collaborated on the workshop development and evaluation. The workshop structure was designed upon the foundations of communication best practices and established techniques, and it consisted of two online modules and an in-person tutorial. Pharmacy students undertaking a four-year Bachelor, Master or Doctor of Pharmacy degree from all three participating universities evaluated the workshop via pre- and post-questionnaires.
Key findings. A total of 81 pharmacy students volunteered to attend and evaluate the workshop. Of these 81 students, 31 completed paired pre- and post-questionnaires, 44 students completed unpaired questionnaires, and 6 students were lost to follow-up. Of the paired pre- and post-questionnaires, students were mostly female (67.7%) with an average age of 24.9 years (Standard Deviation, SD=5.6), and were in the first (32.3%), second (16.1%) or third (51.6%) year of their pharmacy program. Over 80% of students somewhat or strongly agreed that the workshop made them feel more comfortable speaking with young people in pharmacy settings. Mean (SD) perceived confidence (pre=21.7 (4.0) and post=24.9 (4.5)) and knowledge scores (pre=5.2 (1.5) and post=6.6 (1.6)) significantly improved after undertaking the workshop.
Conclusions. The workshop increased pharmacy student perceived confidence and knowledge relating to the importance of adolescent counseling and counseling techniques.

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Key words: adolescent; communication; counselling; education; pharmacy.

INTRODUCTION

Patient-centred care is defined as *" providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions"*.[1] The importance of pharmacists providing patient-centred care has been highlighted in the pharmacy literature.[2] Skills needed to provide patient-centred care to support adolescents' health management and medication use should be taught in pharmacy curricula, as adolescents may be more likely to forget to take their medications when they become more autonomous from their carers.[3] However, current pediatric curricula have been described as inadequate[4] as training tends to focus on adult care. Prescott *et al.* found that only 30 of 73 United States of America (USA) Doctor of Pharmacy programs taught effective communication techniques for children and parents.[5] This deficiency exists despite adolescents: being comfortable and receptive to pharmacist-provided medication education[6]; the potential to improve their use and management of medications[7]; and the importance of them accessing medication-related information.[8]

A 2019 report by the Nuffield Trust and Association for Young People's Health highlighted health challenges and needs of adolescents in the United Kingdom (UK) that require attention.[9] These included high rates of obesity, chronic disease, giving birth (although, not as high as the USA), death associated with asthma (although, not as high as for Australia or the USA), and burden of disease (especially for Type 1 Diabetes), and low rates of exercise,[9] The UK performs less well than 18 similar high-income countries both within and outside of Europe (including Australia and the USA) with regards to supporting young people to manage long-term health conditions.[9] The authors highlighted that health services, professionals, and policy makers may be contributing to these statistics, as young people themselves are making better health choices than~~t~~ in the past.[9]

Pharmacists have a major role in the management of long-term health conditions through their support around adolescent medication use. Gray *et al* identified perceived and potential pharmacist roles in the care of young people with juvenile arthritis, following consultation with UK community and hospital pharmacists, health service commissioners, rheumatology health professionals, and lay advocates.[10]

Adolescents managing a range of long-term health conditions may be better supported by pharmacists who: teach them generic health care skills, such as how to ~~dispense prescriptions~~request repeat supplies of medication; facilitate information transfer between hospitals, community pharmacies and general practitioners; build long-term relationships with adolescents and their families; gain specialist expertise in specific health conditions; and who assist adolescents with finding credible online health information.[10]

Resources are available to support pharmacists when dispensing pediatric prescriptions[11] and providing specific medications that may be used by adolescents, such as emergency hormonal contraception.[12] However, guidance on effective communication between pharmacists and adolescents in general has not been published by the USA, UK or Australian-specific pharmacy organizations. Additionally, pharmacists feel inadequately trained in adolescent-specific issues[13] and they are not always taking the opportunity to provide pediatric-specific medication counselling.[14]

AIM OF THE STUDY

PharmAlliance is an international partnership between the pharmacy schools of the University of North Carolina (UNC) at Chapel Hill (USA), University College London (England) and Monash University (Australia). PharmAlliance provides opportunities for collaborative international efforts to advance and transform research, education and practice in pharmacy and the pharmaceutical sciences worldwide. Academics from each of these three universities collaborated on the development of an elective workshop designed to equip pharmacy students with skills to effectively communicate with adolescents (aged 12-18 years old) and which could be readily incorporated into each university's pharmacy curriculum. Preliminary evaluation of this workshop was undertaken to assess its impact on pharmacy student perceived confidence and knowledge relating to the importance of adolescent counseling and counseling techniques.

METHODS

Workshop Structure

The workshop structure was informed by communication best practices (i.e. open-ended questioning) and established techniques (i.e. Motivational Interviewing[15] and the Teach-Back Method[16] that were already incorporated into the non-pediatric specific curriculum of the three pharmacy schools. The workshop consisted of two online modules (available at: https://apps.media.unc.edu/pharmalliance/#!/home) and an in-person tutorial utilizing a flipped classroom approach. A flipped classroom involves delivering instructional content outside of the classroom, while a tutor engages students in concepts within the classroom.[17] The online module lesson content was conveyed via text, photographs, graphics, and short videos with simulated patients modeling both effective and ineffective communication between pharmacists and adolescents. Lessons concluded with a series of reflective questions for students to consider how concepts could be applied in local community pharmacy settings.

Module 1, entitled 'An Overview of Counseling Young People in Pharmacies,' focused on the health needs of adolescents in the USA, UK and Australia, the importance of effective communication with adolescents in relation to their health needs, and barriers that might impede effective communication. Module 2, entitled 'Strategies for Effectively Counseling Young People in Pharmacies,' comprised three lessons that focused on the fundamental principles of effective communication, Motivational Interviewing, and the Teach-Back Method. Lesson 1 outlined communication micro-skills such as open-ended questioning, affirming, reflecting, and summarizing, and how these strategies could be used to accurately understand patient perceptions about a problem they are experiencing, heighten their problem recognition, and resolve ambivalence; thereby moving them towards positive change.[18] Lesson 2 outlined how these skills could be incorporated when communicating with adolescents using the four guiding principles of Motivational Interviewing, which are Resist the righting reflex, Understand, Listen and Empower: RULE.[19] In lesson 3, the art of providing clinical information and asking patients to explain their understanding of this was described via the Teach-Back Method. [16]

The *in-person tutorial* was accompanied by a tutor's guide, which emphasized the importance of summarizing key points and clarifying questions concerning the online content. The tutor's guide also provided suggestions to guide role-plays, where communication techniques outlined in the online content could be practiced amongst students during the in-person tutorial.

The in-person tutor guide provided instructions on how to facilitate role-plays, available from the corresponding author upon request, involving a pharmacist, patient, observer and a parent, as well as example feedback for the tutor to provide students. A tutor to student ratio was not suggested to allow for inter-university variability. Students could also access medication-related references to assist with counseling. The same tutor conducted each in-person tutorial at each individual university.

Scenarios included medication counseling involving:

- a sensitive topic of conversation, where an antibiotic, indicated for either a sexually or non-sexually transmitted disease, was prescribed for a 17-year old female with a history of using an oral contraceptive;
- a non-sensitive topic of conversation, where an opioid-based cough suppressant was prescribed for a 17-year old male who had not previously been dispensed any medications and was currently playing sports and undertaking exams;
- medication counseling with a parent present, where an oral contraceptive, indicated for either birth control or acne, was prescribed for a 15-year old female who had previously been dispensed topical acne medications; and
- a demonstration-based session for an inhaler prescribed for a 14-year old male who had not previously been dispensed any medications and had recently been diagnosed with exercise-induced asthma.

The scenarios sought to highlight to pharmacy students issues that may be uniquely associated with adolescents as opposed to younger (children) or older (adult) patient groups. These issues included:

assessing whether adolescents were comfortable discussing sensitive topics of conversation with carers present, or, whether they preferred such conversation to be held in private; creating time and space to speak with adolescents in private about their medication use; exploring how medication use challenges may impact on adolescent-specific environments such as secondary school/college, as well as work-life balance that may involve examinations, sport and work pursuits; and empowering adolescents to self-manage medication and device use independently in preparation for adulthood.[20]

The academic research team considered important differences between the USA, UK and Australian cultural and healthcare contexts (e.g., varying over-the-counter, and prescription-only medications) to ensure that the workshop content was relevant to pharmacy practice across all three countries. Specific strategies to ensure relevance included referencing health statistics from all three countries, and ensuring cross-country applicability of medication indications, pharmacy- or healthcare-specific terminology, and communication techniques. Despite the differing roles of the pharmacist across the three countries and the potential influence on patient perceptions, the workshop content advocated for an increased involvement of pharmacists in adolescent medication counseling. For example, anecdotally, the Australian public expect pharmacists to ask questions and provide counseling that is relevant to medication use and primary care, whereas in the UK, pharmacists are not afforded any significant authority other than dispensing medications.

To overcome communication difficulties associated with different time zones and challenges associated with incorporating input from a large, international team, strategies employed included: arranging face-to-face meetings at key stages of the workshop development either in person (e.g. at a conference) or via teleconferencing facilities; nominating a single individual to collect and incorporate input from individual team members; and collaboratively setting deadlines for project milestones.

Evaluation of the workshop was conducted from March-May 2017 via a pre- and post-study design. Participants included pharmacy students undertaking either a four-year Bachelor, Master or Doctor of

Pharmacy degree at each of the three participating universities. Participants included students~~, and~~ who were in contact with the research team members (e.g. being taught in classes led by research team members) and t~~.~~his determined the point within the pharmacy course when the workshops were held. Of the three universities, the workshops were held for: 1) first year Bachelor of Pharmacy students; 2) first, second and third year Doctor of Pharmacy students; and 3) first, second and third year Master of Pharmacy students. The workshop was considered complementary to existing communication curricula in all university year levels. During recruitment, students were provided with study information via face-to-face class announcements, email and/or advertising posters/flyers. Student participation in the workshop and the evaluation was voluntary and participation did not contribute towards university grades.

The online component of the workshop was designed to take approximately 60 minutes to complete and was undertaken using university-specific methods, that is, either in students' own time, or during the in-person, onsite tutorial. The in-person tutorial was also delivered using university-specific methods. Two universities accompanied the approximately 60-minute in-person tutorial with verbal key points summarizing the online content. The third university used university-specific electronic and written material to summarize key points during a 90-minute tutorial.

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The workshop was evaluated using a questionnaire with open- and closed-ended questions (Supplemental Material). The questionnaire was developed and assessed for face and content validity by the research team, where each member of the team independently assessed questions for clarity and to ensure that they met the aims of the evaluation. Suggestions to amend questions were shared amongst the research team and consensus reached regarding any edits. The questionnaire included a measure consisting of 6 items to assess students' perceived confidence in communicating with adolescents in community pharmacy settings (i.e. perceived confidence: communicating with adolescents in a community pharmacy setting to obtain health-related information, helping adolescents understand health information, building rapport, communicating effectively, and using Motivational Interviewing and the Teach-Back Method). Each of the items assessing perceived confidence used a 5-point Likert scale for response options (Strongly Agree to Strongly Disagree); responses to the items were summed for an overall score, which could range from 6 to 30 with higher scores indicating higher perceived confidence. An 11-item knowledge questionnaire measured students' familiarity with key concepts related to counseling adolescents in community pharmacy settings (i.e. perceived knowledge of: prevalence and benefits associated with counseling adolescents, topics to provide counseling in, specific counseling techniques, and available guidelines). Knowledge items were reverse-engineered from content presented in the online workshop modules and included a variety of question types, including true/false and multiple choice. Students were given one point for each question that was answered correctly on the assessment; knowledge scores could therefore range from 0 to 11 with higher scores indicating greater knowledge. The baseline questionnaire explored:

demographic details, prior experience of adolescent-specific counseling or related coursework, perceived confidence in communication, and current knowledge of communicating with adolescents in community pharmacy settings. The follow-up questionnaire included identical questions to the baseline questionnaire, as well as open-ended questions exploring overall workshop evaluation and perceived usefulness and satisfaction associated with the workshop (for example, workshop strengths, and suggested strategies to improve the learning experience). Two universities included questions or identifiers to allow pre- and post-questionnaire responses to be paired for each student, while the third university did not. The questionnaire was delivered using university-specific methods, either in hard-copy or online, to be completed onsite or in students' own time.

One university obtained ethical approval to evaluate the workshop from the Monash University Human Research Ethics Committee (April 2017, Project Number: 8591), where implied consent to evaluate the workshop was received upon submission of a questionnaire. Evaluation of the workshop was determined to be exempt from ethical approval at tThe remaining two universities, after one university submitted an application to their Institutional Review Board, and the second university sought and obtained advice from their University Ethics Committeewere exempt from ethical approval.

Descriptive statistics were calculated using SAS version 9.4 (Cary, NC). Categorical variables were summarized in terms of frequency and percentage. Age was summarized in terms of mean and standard deviation (SD). In the two universities that provided paired questionnaire responses and where an approximately 60-minute in-person tutorial was accompanied by verbal key points summarizing the online content, student baseline and follow-up perceived confidence and knowledge scores were compared using a paired samples t-test. In the third university, mean scores were computed for unpaired questionnaire responses. Limited pParticipant feedback that was provided via open-ended questions did not warrant full qualitative analysis, however, it provided insight into students' perspectives following their workshop participation.

RESULTS

A total of 81 pharmacy students volunteered to attend and evaluate the workshop. Of these 81 students, 31 completed paired pre- and post-questionnaires, 44 students completed unpaired questionnaires, and 6 students were lost to follow-up. With regards to the 31 paired responses from two universities (n=6 first year students from one university, and n=4 first year, n=5 second year and n=16 third year students from the second university), students were mostly female (67.7%) with an average age of 24.9 years (SD=5.6), and were in the first (32.3%), second (16.1%) or third (51.6%) year of their pharmacy program. A total of 22.6% had personal experience counseling young people in a pharmacy setting, and 61.3% had taken a prior workshop or read educational material related to improving communication skills as a pharmacist in general (not specifically related to adolescents).

Over 80% of students somewhat or strongly agreed the workshop made them feel more comfortable speaking with young people in pharmacy settings, encouraged them to consider how they would apply the information to their current practice as a pharmacy student and future practice as a pharmacist, and encouraged them to think differently (Table 1).

(insert Table 1 here)

The mean (SD) perceived confidence (pre=21.7 (4.0) and post=24.9 (4.5)) and knowledge scores (pre=5.2 (1.5) and post=6.6 (1.6)) significantly improved after undertaking the workshop ($p<0.001$) (Table 2).

(insert Table 2 here)

There was no significant association between pharmacy program year of study and ~~difference in mean~~ perceived confidence (pre-test p-value=0.758 and post-test p-value=0.242) and knowledge scores

(pre-test p-value=0.451 and post-test p-value=0.711) ~~based on the participant's pharmacy program year level~~.

A total of 44 pharmacy students (first year n=28, second year n=10 and third year n=6 students all from a single university) completed unpaired pre- and post-questionnaire responses. Whole sample paired results from the 44 pre- and 44-post questionnaires showed similar findings in pre- and post-questionnaire mean (SD) perceived confidence (pre=21.3 (4.2), p-value=0.757 and post=25.3 (3.6), p-value=0.680) and post-questionnaire knowledge scores (post=6.2 (1.9), p-value=0.328). However, statistically significant differences were observed for pre-questionnaire knowledge scores (pre=3.9 (1.6), p-value=0.001) between students whose responses were paired and those whose responses were unpaired (i.e. significantly lower pre-knowledge scores were seen in students whose responses were unpaired).

Findings from the quantitative evaluation were similar across all three countries. There was no significant association between country and ~~No statistically significant differences were found in~~ the levels of ~~mean~~ responses to the ~~questionnaire~~ question "What is your overall rating of this ~~course~~workshop?" (p-value=0.689) or to a composite score comprising five questions where higher scores indicate higher satisfaction with the ~~course~~ workshop (p-value=0.225).

Qualitative feedback from students indicated that the workshop was positively received ~~(Table 3)~~. In general, students reported that the workshop was useful, well-organized, fulfilled its objectives, and provided information that was not included in other workshops. Students also offered suggestions on how the workshop could be improved, such as including additional assessment opportunities and incorporating patient views on medication counseling.

~~*(insert Table 3 here)*~~

DISCUSSION

The workshop increased pharmacy student perceived confidence and knowledge relating to the importance of counseling and counseling techniques for adolescents. This study is the first evaluation of a workshop designed by academics from three countries to equip pharmacy students with skills to effectively communicate with adolescents, utilizing a flipped classroom approach.

It is a limitation that students volunteered to undertake the workshop, which may limit generalizability. Students who volunteered may be more interested in communicating with adolescents, more likely to evaluate the workshop favourably, and may provide more socially-desirable responses. Secondly, the workshop was designed to be relevant and applicable to students in the USA, UK and Australia and may therefore have limited applicability to countries with substantially different university pharmacy programs and pharmacy work practices. For example, the health statistics referenced in the online modules and the role-play scenarios were relevant to USA, UK and Australian pharmacy services and cultural contexts. The cultural environment in which the role-played conversations between the pharmacist and adolescent occur plays a significant part in the compliance and counseling outcome and is related to the public's perceived professional authority of the pharmacist. Therefore, carrying out this study in collaboration with universities from countries other than the USA, UK and Australia may lead to different findings and challenges. Thirdly, a small sample size of students had matching pre- and post- questionnaires.- Further research is needed, with larger sample sizes, to explore why significantly lower pre-knowledge scores were seen in students whose responses were unpaired. Lastly, students were from different universities, and were undertaking varied pharmacy programs in multiple year levels. As a result, students are likely to have had varied course work and clinical and work placements and therefore varied levels of experience and training in medication counseling. These different backgrounds may have influenced the relevance of the workshop between students. The varied pharmacy programs may contribute towards the finding that significantly lower pre-knowledge scores were seen in students whose responses were unpaired. It was not possible to analyse results by student year level due to the small sample size.

Despite this, the workshop was generally evaluated favourably and findings show great potential for future, large scale evaluation in specific student year levels and participant groups.

It is a strength that this study evaluated an engaging and reproducible workshop, which was informed by international expertise from three countries. Despite university-specific variations in workshop delivery and evaluation, similarly positive evaluation results were shown across the three universities, highlighting the ability of the workshop to be adapted for local university settings in those countries. Future research using larger sample sizes should explore if university-specific methods for delivering the in-person tutorial impacts on study findings. The impact of the third university's in-person tutorial running for 30-minutes longer and including electronic and written material is difficult to determine with small sample sizes.

Pharmacy programs have employed diverse teaching and learning activities to develop understanding and apply knowledge associated with professional practice. A range of approaches have been used to develop and evaluate new modules introduced into pharmacy curricula, such as multi-faceted interactive programs, blended learning (a combination of web-based online learning and traditional face-to-face instruction) and flipped classrooms.[21-27] Similar to the findings of this study, positive impacts have been reported by students, which have highlighted the value in understanding material, improved perceived confidence regarding both subject matter and its potential application in community practice settings, and the application of specific techniques for providing patient care.

National professional pharmacy organizations should consider offering continuing education to practicing pharmacists that focuses on communicating with adolescents. This education can be facilitated via collaboration with organisations that specifically advocate for pediatric patient pharmacy services, such as the Pediatric Pharmacy Association (PPAG, Tennessee). The potential benefits of collaboration between pharmacists and adolescent sexual health providers has been highlighted, including increased understanding of issues associated with oral contraceptive provision.[28] The workshop developed in the current study could be used in continuing education

programs aimed at improving practicing pharmacist confidence and knowledge in communicating with adolescents. Future research should develop further educational material, such as communication checklists and templates to facilitate more effective counseling, and to in turn support pharmacists to empower adolescents to be more involved in discussions with their healthcare providers.[29]

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Future research should assess workshop applicability in other countries and determine its optimal placement within pharmacy curricula, as well as if the workshop improves objectively measured communication.

CONCLUSION

Academics from universities in three countries collaborated on the development and evaluation of a workshop that resulted in positive learning outcomes, and addressed an internationally poorly met need in pharmacy education. The workshop provides a framework that can be adapted in pharmacy schools world-wide, potentially increasing confidence and knowledge of pharmacists in supporting adolescents to achieve improved health outcomes.

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Table 1. Student satisfaction with workshop, (post-test), N=31, n (%)

Question	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
The information presented in this workshop…					
… was mostly new to me.	0	7 (22.6)	2 (6.5)	17 (54.8)	5 (16.3)
… has made me feel more comfortable speaking with young people in the pharmacy setting.	0	1 (3.2)	4 (12.9)	14 (45.2)	12 (38.7)
… has encouraged me to consider how I would apply the information to my current practice as a pharmacy student.[a]	0	1 (3.3)	2 (6.7)	6 (20.0)	21 (70.0)
… has encouraged me to consider how I would apply the information to my future practice as a pharmacist	0	1 (3.2)	2 (6.5)	5 (16.1)	23 (74.2)
… has comprehensively covered the topic of youth counselling in the pharmacy setting.	0	4 (12.9)	6 (19.4)	17 (54.8)	4 (12.9)
… has encouraged me to think differently.	0	1 (3.2)	4 (12.9)	9 (29.0)	17 (54.8)
The online material…					
… was interesting to me.	0	1 (3.2)	2 (6.5)	14 (45.2)	14 (45.2)
… was applicable to pharmacy practice in my country.	0	1 (3.2)	3 (9.7)	6 (19.4)	21 (67.7)

[a]n=30

Table 2. Perceived confidence and knowledge score from the pre- and post-test questionnaire, n=31

Measure	**Pre-test Mean (SD)**	**Post-test Mean (SD)**	**Difference[a] Mean (SD)**	**p-value[b]**
Confidence score	21.7 (4.0)	24.9 (4.5)	3.3 (4.4)	0.0003
Knowledge score	5.2 (1.5)	6.6 (1.6)	1.5 (2.0)	0.0004

[a]Difference = post-test score – pre-test score

[b]p-values based on paired samples t-test, df=30.

Table 3. **Selected student feedback**

"The instructions were clear and information was very practical and useful."
"Touches on a unique subject that our curriculum doesn't focus on."
"It was short enough but the information was presented succinctly and it flowed well."
"It provided useful techniques and lines to use in counseling patients."
"Good practice for real life consultations."
"Include some more assessments/activities within the online learning modules to help us gauge our learning progress."
"More content from a teen's (adolescent) *perspective- more insight into what seems effective for a teen* (adolescent) *in regards to counseling by a pharmacist…."*

Thank you for reviewing our manuscript 'Preparing pharmacy students to communicate effectively with adolescents'.
Please see author responses to editorial/reviewer comments below.

#	Editorial/Reviewer comment	Author Response	Manuscript Changes (please see red text below and track changes in the manuscript)
	Editorial comments		
1	Page 3 line 4, as noted by the other reviewer it is not clear what you mean by teaching adolescents how to dispense prescriptions. Do you mean as they have suggested that this is about obtaining their prescription from the pharmacy, or is it about how they administer their medicines.	Manuscript Amended	**Section: Introduction, Page: 3** Adolescents managing a range of long-term health conditions may be better supported by pharmacists who: teach them generic health care skills, such as how to request repeat supplies of medication; facilitate information transfer between hospitals, community pharmacies and general practitioners; build long-term relationships with adolescents and their families; gain specialist expertise in specific health conditions; and who assist adolescents with finding credible online health information.[10]
2	On page 7 under Evaluation, lines 4 to 18, describing further details of the workshop, please move these back into the previous section perhaps at the bottom of page 6. They are about the workshop per se not its evaluation. Please also make clear how many students in each University actually attended the workshops, and the point within the four year course when the workshops were held For example were they first, second, third or fourth year?	Manuscript Amended Lines 4-18 under Evaluation have been moved into the previous section, as per the recommendation.	**Section: Abstract, Page: 1** **Key findings.** A total of 81 pharmacy students volunteered to attend and evaluate the workshop. Of these 81 students, 31 completed paired pre- and post-questionnaires, 44 students completed unpaired questionnaires, and 6 students were lost to follow-up. **Section: Results, Page: 10** A total of 81 pharmacy students volunteered to attend and evaluate the workshop. Of these 81 students, 31 completed paired pre- and post-questionnaires, 44 students completed unpaired questionnaires, and 6 students were lost to follow-up. With regards to the 31 paired responses from two universities (n=6 first year students from one university, and n=4 first year, n=5 second year and n=16 third year students from the second university), students were mostly female (67.7%) with an average age of 24.9 years (SD=5.6), and were in the first (32.3%), second (16.1%) or third (51.6%) year of their pharmacy program. A total of 22.6% had personal experience counseling young people in a pharmacy setting, and 61.3% had taken a prior workshop or read educational material related to improving communication skills as a pharmacist in general (not specifically related to adolescents).

			Section: Results, Page: 11 A total of 44 pharmacy students (first year n=28, second year n=10 and third year n=6 students all from a single university) completed unpaired pre- and post-questionnaire responses. Whole sample paired results from the 44 pre- and 44-post questionnaires showed similar findings in pre- and post-questionnaire mean (SD) perceived confidence (pre=21.3 (4.2), p-value=0.757 and post=25.3 (3.6), p-value=0.680) and post-questionnaire knowledge scores (post=6.2 (1.9), p-value=0.328). However, statistically significant differences were observed for pre-questionnaire knowledge scores (pre=3.9 (1.6), p-value=0.001) between students whose responses were paired and those whose responses were unpaired (i.e. significantly lower pre-knowledge scores were seen in students whose responses were unpaired). **Section: Methods, Page:6-7** Evaluation of the workshop was conducted from March-May 2017 via a pre- and post-study design. Participants included pharmacy students undertaking either a four-year Bachelor, Master or Doctor of Pharmacy degree at each of the three participating universities. Participants included students who were in contact with the research team members (e.g. being taught in classes led by research team members) and this determined the point within the pharmacy course when the workshops were held. Of the three universities, the workshops were held for: 1) first year Bachelor of Pharmacy students; 2) first, second and third year Doctor of Pharmacy students; and 3) first, second and third year Master of Pharmacy students.
3	On page 8 you have described the content of the questionnaire; please make clear that you are adding both the pre-and post questionnaires as supplemental material. This means that they will be available to readers on the online version of your paper, but not the print version.	Manuscript Amended The pre- and post-questionnaires will be added as supplemental material.	**Section: Evaluation, Page: 8** The workshop was evaluated using a questionnaire with open- and closed-ended questions (Supplemental Material).
4	It does not make clear in your description of the questionnaire content where the qualitative data is collected - yet you refer to this in the analysis section and in the results.	Manuscript Amended	**Section: Evaluation, Page:9** The follow-up questionnaire included identical questions to the baseline questionnaire, as well as open-ended questions exploring overall workshop evaluation and perceived usefulness and satisfaction associated with the workshop (for example, workshop strengths, and suggested strategies to improve the learning experience).
5	You say that two universities did not need ethical approval for the study, but it is not clear who	Manuscript Amended	**Section: Evaluation, Page: 9**

	made this decision. Please describe the process that was undertaken, for example did they seek and obtain written independent advice from a university or NHS ethics committee confirming ethical approval was not needed.		One university obtained ethical approval to evaluate the workshop from the Monash University Human Research Ethics Committee (April 2017, Project Number: 8591), where implied consent to evaluate the workshop was received upon submission of a questionnaire. Evaluation of the workshop was determined to be exempt from ethical approval at the remaining two universities, after one university submitted an application to their Institutional Review Board, and the second university sought and obtained advice from their University Ethics Committee.
6	At the start of the results please say what percentage of the participants attending volunteered to take part, and the year the students are in if this was a mixture, and the number for each university. I'm also assuming that the 31 for whom you have pre and post questionnaires were from two universities, and the 44 who completed unpaired questionnaires were from the University who did not collect IDs. Please be clear that nonetheless you had 44 pre- and 44 post questionnaires . If this is not the case please describe exactly what the situation was.	Manuscript Amended	**Section: Results, Page: 10** A total of 81 pharmacy students volunteered to attend and evaluate the workshop. Of these 81 students, 31 completed paired pre- and post-questionnaires, 44 students completed unpaired questionnaires, and 6 students were lost to follow-up. With regards to the 31 paired responses from two universities (n=6 first year students from one university, and n=4 first year, n=5 second year and n=16 third year students from the second university), students were mostly female (67.7%) with an average age of 24.9 years (SD=5.6), and were in the first (32.3%), second (16.1%) or third (51.6%) year of their pharmacy program. A total of 22.6% had personal experience counseling young people in a pharmacy setting, and 61.3% had taken a prior workshop or read educational material related to improving communication skills as a pharmacist in general (not specifically related to adolescents). **Section: Results, Page: 11** A total of 44 pharmacy students (first year n=28, second year n=10 and third year n=6 students all from a single university) completed unpaired pre- and post-questionnaire responses. Whole sample paired results from the 44 pre- and 44-post questionnaires showed similar findings in pre- and post-questionnaire mean (SD) perceived confidence (pre=21.3 (4.2), p-value=0.757 and post=25.3 (3.6), p-value=0.680) and post-questionnaire knowledge scores (post=6.2 (1.9), p-value=0.328). However, statistically significant differences were observed for pre-questionnaire knowledge scores (pre=3.9 (1.6), p-value=0.001) between students whose responses were paired and those whose responses were unpaired (i.e. significantly lower pre-knowledge scores were seen in students whose responses were unpaired).
7	When you discuss the difference in scores by participants' pharmacy program year level, I wonder if you would be better to be referring to	Manuscript Amended	**Section: Results, Page: 10** There was no significant association between pharmacy program year of study and

	an association with year of study. Similarly you may be better to refer to association when you are later talking about country differences.		perceived confidence (pre-test p-value=0.758 and post-test p-value=0.242) and knowledge scores (pre-test p-value=0.451 and post-test p-value=0.711). **Section: Results, Page: 11** Findings from the quantitative evaluation were similar across all three countries. There was no significant association between country and the levels of response to the question "What is your overall rating of this workshop?" (p-value=0.689) or to a composite score comprising five questions where higher scores indicate higher satisfaction with the workshop (p-value=0.225) .
8	Do you think it is meaningful that the lower pre-knowledge scores associated with students who gave unpaid responses? Could this just be an artefact of the data?	Manuscript Amended	**Section: Discussion, Page: 12** Thirdly, a small sample size of students had matching pre- and post- questionnaires. Further research is needed, with larger sample sizes, to explore why significantly lower pre-knowledge scores were seen in students whose responses were unpaired.
9	Finally please restructure your discussion in line with the author guidelines which state the content and ordering of the different paragraphs. In summary there should be a short initial paragraph summarising the main findings, followed by a description of the limitations and strengths of your study, followed by interpretation of the results in general and implications prior to your conclusion.	Manuscript Amended The manuscript has been restructured as per the recommendation.	
10	Table 3 'selected student feedback ' maybe should be referred to as 'examples of student feedback'? How are these quotes selected and by whom? Are they considered representative?	Manuscript Amended Table 3 has been removed as, upon reflection, it does not provide substantial additional information to manuscript text (see text in the column to the right), and, the limited feedback prevented full qualitative analysis.	**Section: Methods, Page: 9** Limited participant feedback that was provided via open-ended questions did not warrant full qualitative analysis, however, it provided insight into students' perspectives following their workshop participation. **Results Page:10** Qualitative feedback from students indicated that the workshop was positively received. In general, students reported that the workshop was useful, well-organized, fulfilled its objectives, and provided information that was not included in other workshops. Students also offered suggestions on how the workshop could be improved, such as including additional assessment opportunities and incorporating patient views on medication counseling.

	Reviewer Comments		
11	P2 Line 25 – typing error assumed – not '….that in the past' but '…than in the past.'	Manuscript Amended	**Section: Introduction, Page: 2** The authors highlighted that health services, professionals, and policy makers may be contributing to these statistics, as young people themselves are making better health choices than in the past. [9]
12	P3 Line 4 – I would recommend a change from '…how to dispense prescriptions' (they are not training to be pharmacists!), but 'how to get repeat supplies of medication'.	Manuscript Amended	Section: Introduction, Page: 3, Lines:1-6 Adolescents managing a range of long-term health conditions may be better supported by pharmacists who: teach them generic health care skills, such as how to request repeat supplies of medication; facilitate information transfer between hospitals, community pharmacies and general practitioners; build long-term relationships with adolescents and their families; gain specialist expertise in specific health conditions; and who assist adolescents with finding credible online health information.[10]

Baseline Questionnaire

Section 1. Prior Experiences with Adolescent Counseling

First, we would like to ask you some questions about your prior experiences counseling adolescents or any coursework you have taken on this subject matter.

1. Do you have personal experience counseling adolescents in a pharmacy setting? (please circle) Yes No

2. Have you taken any prior courses or read any educational materials related to improving your communication skills as a pharmacist? (please circle) Yes No

3. If yes, did these courses or educational materials include information about communicating specifically with youth? (please circle) Yes No

Section 2. Communication Self-Efficacy

For the next set of questions, we would like to know how comfortable you are communicating with young people as a pharmacist. Please tell us how much you agree or disagree with the following statements.

Question	Please CIRCLE your response				
4. I am confident in my ability to gain information from young people about their health-related motivations, challenges and goals.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
5. I am confident that I can help young people understand the health information that I give them.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
6. I am confident that I can build rapport with young people.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
7. I feel confident that I have the skills needed to communicate effectively with young people.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
8. I feel confident that I could use motivational interviewing in my consultations with young people.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
9. I feel confident that I could use the Teach-Back method in my consultations with young people.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree

Section 3. Personal Characteristics

Next, we would like to ask you some questions about yourself and your background.

10. Which university do you attend? (please circle) UNC Monash UCL

11. What year are you in your pharmacy program? (please circle) PY1 PY2 PY3 PY4

12. What is your gender? (please circle) Male Female

13. How old are you?_____

Section 4. Workshop Content

For the final set of questions, we would like to assess your current knowledge of communicating with young people in pharmacy settings.

14. Pharmacist counseling of young people can improve which of the following? Circle all that apply.

Medication adherence Disease self-management Clinical outcomes Medication safety

15. Pharmacists are well-suited to counsel young people for which of the following reasons? Check all that apply.

- ❍ Pharmacists are knowledgeable, credible sources of medication information
- ❍ All pharmacists receive training in adolescent counseling as part of their pharmacy curriculum
- ❍ Pharmacists are often more accessible to young people than other healthcare providers
- ❍ Unlike doctors, pharmacists are legally allowed to counsel adolescents without their parents present

16. On which of the following topic areas should pharmacists be prepared to counsel adolescents? Circle all that apply. Smoking Substance Abuse Sexual Activity Prescription Medication Use

17. Which of the following are recommended counseling techniques that can be used to ensure young people take medicine correctly and consistently? Circle all that apply.

Walsh Method Motivational Interviewing Support and Persuade Model Teach-Back Method

18. There are multiple types of reflective listening. When a pharmacist listens to what a patient says and then repeats it back in different words, this is called: (please circle)

Simple reflective listening Complex reflective listening Amplified reflective listening

19. You're Welcome is a comprehensive, unified framework intended for use by health professionals treating young people. It has been adopted by the United States, the UK and Australia as the leading guidance on adolescent healthcare. (please circle)

True False Don't Know

20. The exact prevalence of adolescent counseling in pharmacy settings is unknown. However, recent estimates from the US indicate that such counseling is likely to occur for approximately 50% of young people. (please circle)

True False Don't Know

21. What are three common, chronic health conditions that are prevalent among adolescents?

_____

22. Pharmacists should ask patients open-ended questions to prompt dialogue and conversation. (please circle)

True False Don't Know

23. For all patients, maintaining eye contact helps build rapport. (please circle)

True False Don't Know

24. To be effective at motivational interviewing, pharmacists should try to avoid persuading patients to make the right decisions in regards to their health. (please circle) True False Don't Know

25. Resist, Understand, Listen and Empower (or RULE) encapsulates the four guiding principles of the Teach-Back Method. (please circle) True False Don't Know

26. When using the Teach-Back method, pharmacists should ask patients "Do you understand?" whenever necessary to verify comprehension. (please circle) True False Don't Know

Follow-up Questionnaire

Section 1. Overall Workshop Evaluation

Question	Please CIRCLE your response				
1. The workshop content was clearly related to the overall workshop outcomes and objectives.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
2. Information contained within the workshop was well-organized.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
3. I was able to access the workshop without any technical difficulties.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
4. The workshop activities (e.g., in-class exercises, online materials) helped me better understand the information contained within the workshop.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
5. Overall, this workshop encouraged me to think deeply about the information contained within it.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree

For the next questions, please provide brief, but specific responses when possible.

6. Please comment on the strengths of this workshop.

_____

7. Please comment on what would have made the workshop a better learning experience for you.

_____

8. What is your overall rating of this workshop? (please circle)

Poor Fair Good Very Good Excellent

The final questions in this section are regarding the usefulness of the workshop to you and your satisfaction with the material. Please tell us how strongly you agree or disagree with the following statements.

Question	Please CIRCLE your response				
In my opinion, the information presented in this workshop...					
9. ...was mostly new to me.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
10. ...has made me feel more comfortable speaking with young people in the pharmacy setting.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
11. ...encouraged me to consider how I would apply the information to my current practice as a pharmacy student.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
12. ...has encouraged me to consider how I would apply the information to my future practice as a pharmacist.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
13. ...has comprehensively covered the topic of youth counselling in the pharmacy setting.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree

14. ...has encouraged me to think differently.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
In my opinion, the online material...					
15. ...was interesting to me.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree
16. ...was applicable to pharmacy practice in my country.	1 Strongly agree	2 Somewhat agree	3 Neither agree nor disagree	4 Somewhat disagree	5 Strongly disagree

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26. Which of the following are recommended counseling techniques that can be used to ensure young people take medicine correctly and consistently? Circle all that apply.

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28. You're Welcome is a comprehensive, unified framework intended for use by health professionals treating young people. It has been adopted by the United States, the UK and Australia as the leading guidance on adolescent healthcare. (please circle)

True False Don't Know

29. The exact prevalence of adolescent counseling in pharmacy settings is unknown. However, recent estimates from the US indicate that such counseling is likely to occur for approximately 50% of young people. (please circle)

True False Don't Know

30. What are three common, chronic health conditions that are prevalent among adolescents?

_____

31. Pharmacists should ask patients open-ended, "Why?" questions to prompt dialogue and conversation. (please circle)

True False Don't Know

32. For all patients, maintaining eye contact helps build rapport. (please circle)

True False Don't Know

33. To be effective at motivational interviewing, pharmacists should try to avoid persuading patients to make the right decisions in regards to their health. (please circle)

True False Don't Know

34. Resist, Understand, Listen and Empower (or RULE) encapsulates the four guiding principles of the Teach-Back Method. (please circle)

True False Don't Know

35. When using the Teach-Back method, pharmacists should ask patients "Do you understand?" whenever necessary to verify comprehension. (please circle)

True False Don't Know