Communication skills teaching for student dietitians using experiential learning and simulated patients

Knight, A.; Baldwin, C.; Reidlinger, D. P.; Whelan, K.

Published in:
Journal of Human Nutrition and Dietetics

DOI:
10.1111/jhn.12743

Licence:
Other

Communication skills teaching for student dietitians using experiential learning and simulated patients

Annemarie Knight, Christine Baldwin, Dianne P Reidlinger, Kevin Whelan

Keywords – dietitian, dietetics education, professional practice, communication, simulation

Word count- Abstract 245, Text 4046 excluding references, tables and figures

Author contact information

Corresponding author and institution where work performed:

Annemarie Knight

Programme Director - Dietetics, Senior Lecturer in Nutrition and Dietetics Education, King's College London, Department of Nutritional Sciences, Franklin Wilkins Building, 150 Stamford Street, London, SE1 9NH, United Kingdom

annemarie.knight@kcl.ac.uk

+44 (0)20 7848 4259

Dr Christine Baldwin

Lecturer Nutrition and Dietetics, King's College London, Department of Nutritional Sciences, Franklin Wilkins Building, 150 Stamford Street, London, SE1 9NH, United Kingdom

christine.baldwin@kcl.ac.uk

+44 (0)20 7848 4318

Dr Dianne Reidlinger

Lecturer, King's College London, Department of Nutritional Sciences, Franklin Wilkins Building, 150 Stamford Street, London, SE1 9NH, United Kingdom (at time of study)

Associate Professor, Nutrition and Dietetics, Faculty of Health Sciences and Medicine, Bond University, QLD 4226, Australia (at present)

+61 7 5595 0160

dreidlin@bond.edu.au

Professor Kevin Whelan

Professor of Dietetics, Head of Department of Nutritional Sciences, King's College London, Department of Nutritional Sciences, Franklin Wilkins Building, 150 Stamford Street, London, SE1 9NH, United Kingdom

kevin.whelan@kcl.ac.uk

+44 (0)20 7848 3858

Author contributions

CB, DR and KW designed the study. AMK, CB and KW analysed the data and AMK wrote the first draft with contributions from CB and KW. All authors reviewed and commented on subsequent drafts of the manuscript.

There was no funding or support for this research

There are no potential conflicts of interest

Acknowledgements

The authors are grateful to Dr Bernadette O Neill for guidance on the experiential learning model, to the students who completed the evaluation questionnaires and to Suzannah Owen for data entry

Transparency declaration

The lead author affirms that this manuscript is an honest, accurate and transparent account of the study being reported. The reporting of this work is compliant with STROBE guidelines. The lead author affirms that no important aspects of this study have been omitted and that any discrepancies from the study as planned have been explained.

Ethics declaration

Ethical approval was not required for this service evaluation of communication skills training. Participation was voluntary, completed questionnaires were anonymised and assigned a unique identifier for matching purposes and the anonymised data were entered by researchers independent of the teaching team prior to analysis.

Communication skills teaching for student dietitians using experiential learning and simulated patients

Abstract

Background

Dietitians require communication competencies for effective dietetic practice. There is little evidence on how student dietitians experience and value communication skills teaching. This study aimed to measure attitudes of student dietitians to communication skills teaching and how experiential learning using simulated patients impacts confidence in their communication skills.

Methods

Communication skills teaching adopting an experiential skills-based approach including practice with simulated patients, feedback and reflection was developed. A 67-item questionnaire with three sections: (i) views regarding the importance of communication skills to dietetic practice; (ii) attitudes to learning communication skills using a modified Communication Skills Attitude Scale; and (iii) confidence in their own communication skills was completed by students before and after the course with responses recorded on a five-point Likert scale and analysed pairwise using McNemar's test.

Results

Over three academic years, 112 students (91.8% response rate) completed the evaluation. After training students rated communication skills as important for patient satisfaction (100%) and relationships with patients (99.1%). Student dietitians had positive attitudes to learning communication skills with Positive Attitudes Scale (PAS) score before teaching of mean 53.6 (SD 5.3) and after of 54.0 (5.8) (p=0.162). Following experiential teaching, the proportion of students feeling 'very or extremely confident' in understanding a patient's perspective increased from 27.7% to 41.1% (p=0.008) and for reaching agreement with a patient from 4.5% to 17.9% (p=0.001).

Conclusions

Student dietitians consider communication skills important for dietetic practice. They receive teaching positively and an experiential skills-based approach can improve self-rated confidence.

Communication skills teaching for student dietitians using experiential learning and simulated patients

Introduction

Effective communication is a fundamental component of dietetic practice and is critical to the success of nutrition interventions across all settings[1]. Interpersonal communication has been identified as one of the defining features of professionalism in dietetic practice[2]. This is reflected in the prominence given to communication skills in curricula and professional standards internationally[3; 4; 5].

In recent years there has been a move to a more patient-centred approach in healthcare. The principles of patient-centred care afford people dignity, compassion and respect whilst offering co-ordinated, personalised and enabling care[6; 7]. Research confirms that patient-centred care is also important to patients[8]. The World Health Organization endorse the broader people-centred approach in both clinical encounters and public health settings[9]. Communication skills are fundamental to the provision of patient-centred care and are a key competence for dietitians.

Studies exploring effective communication in dietetic practice measure different aspects of communication using different tools, but identify a range of positive aspects of communication[1; 10; 11; 12; 13]. Skills such as active listening, paraphrasing and questioning are important communication skills that help develop collaborative relationships with patients[14]. Dietitians require a range of communication competencies to enhance the dietitian-patient relationship[15]. In practice, teaching methods in this area are evolving, moving from traditional didactic approaches to more experiential methods [16]and acquiring the range of communication competencies required relies on student dietitians valuing and engaging with training in this area.

Registered dietitians have reported some dissatisfaction with their pre-registration training in communication skills. Dietitians in the UK reported that their pre-registration training was deficient in active listening skills and behaviour change techniques[17], which was confirmed in a more recent survey where only 44% of dietitians reported having communication skills training for behaviour change during pre-registration training with lectures, role play and observation being the preferred teaching methods [18]. Dietitians in Australia varied in their perceptions of how pre-registration training prepared them for counselling in practice, with 49% rating it 'good or excellent' among those qualifying between 1964 and 1987, rising to

87% in those graduating in the previous three years[19]. In a study examining the nutrition counselling self-efficacy of dietitians in the USA, those with the lowest scores were generally newly qualified and inexperienced with higher scores associated with years of experience and skill usage[20]. These studies conclude that dietitians perceive pre-registration training should have more communication training with greater emphasis on skills rather than knowledge but do not specifically measure the attitudes, experiences and confidence of student dietitians regarding communication skills and communication skills training.

Understanding attitudes to communication skills and communication skills teaching is of paramount importance[21]. Studies in medical students report more positive attitudes to learning communication skills among females and younger students[21; 22]. However, there is limited research on attitudes among student dietitians. In a survey of 300 student dietitians, no differences in attitudes to communication skills were identified between females and males (although 95.7% of respondents were female). Students held more positive attitudes to learning communication skills earlier in their university career, with a decline during their training[23]. This study did not address how communication skills were taught across the different universities and it is unclear whether the method of teaching communication skills influences students' attitudes to learning.

Communication skills teaching has evolved to reflect more recent evidence regarding effectiveness[1]. Experiential learning can enhance healthcare students' engagement with teaching and communication skills development[24], and although there are only limited studies, role playing can be effective[25]. Simulated patients and objective structured clinical exams (OSCE), assessments designed to test clinical skill performance and competence in relation to key aspects of a consultation, are increasingly employed to provide experiential learning opportunities for students to apply theory, practise skills and receive feedback[26]. Despite extensive research on simulated patients and OSCEs among medical and nursing students, almost no research has been undertaken in student dietitians. In one study, repeated exposure of dietetic students to simulated patients during OSCEs improved communication skills, particularly for students who were borderline on initial assessment[27]. Further research is warranted on the effectiveness of this resource-intensive approach in dietetic pre-registration education.

The aim of this study was to measure pre-registration student dietitians' attitudes to communication skills and communication skills training and to evaluate the impact of experiential learning using simulated patients and OSCEs on their confidence in their own communication skills.

Methods

This study was an evaluation of pre-registration dietetic students' compulsory communication skills teaching, completed as part of their programme at King's College London, using a before and after questionnaire design.

Communication skills teaching

Students undertaking either a Bachelor of Science in Nutrition and Dietetics (4 years) or a Postgraduate Diploma/Masters in Dietetics (1.5–2 years) completed a communication skills course as part of their programme. This was delivered after a two-week introductory practice placement and immediately before a 12-week practice placement in the latter part of the programme. The course includes a component specifically for communication skills that adopts an experiential skills-based approach rather than a didactic teaching style[16]. The course content covers the essential communication skills required for dietetic practise including the concepts of patient-centred care and nutrition counselling[4; 28].

The essential elements of this experiential learning model include defining and isolating the essential skills that need to be taught in order to provide a focus for each skills-based session [16], direct observation of students using simulated patients, provision of detailed and constructive verbal feedback and enabling communication skills to be practised until attained (**Figure 1**). The course was delivered using a mixture of teaching strategies incorporating formal classroom teaching, communication skills practise with simulated patients (trained patient actors), including active participation as both a participant and observer, peer feedback, and assessed using summative OSCEs. This took the form of six three-hour sessions, each focussed on an aspect of communication skills, facilitated by registered dietitians trained in

working with simulated patients and facilitating feedback. The simulated patients were actors trained in undertaking patient-related teaching activities and are used widely in medical, nursing and healthcare education throughout the College.

Questionnaire survey

All students were invited to complete a questionnaire before (immediately before starting) and after (within 16 weeks) the communication skills teaching component of the course during the academic years 2012-13, 2013-14 and 2015-16. The survey was not undertaken in 2014-2015. Ethical approval was not required for this service evaluation of communication skills training[29]. Participation was voluntary, completed questionnaires were anonymised and assigned a unique identifier for matching purposes and the anonymised data were entered by researchers independent of the teaching team prior to analysis.

The 67-item questionnaire consisted of three sections: (i) attitudes regarding the importance of communication skills to dietetic practice; (ii) attitudes to learning communication skills; and (iii) confidence in their own communication skills. Questions were developed following a review of the literature on communication skills in healthcare.

Views on the importance of communication skills in dietetic practice were measured using 10 questions from an unvalidated questionnaire used previously to measure the views of dietitians regarding communication skills for behaviour change[18]. Each question related the importance of communication skills to an aspect of practice (e.g. patient satisfaction, relationships with patients and colleagues) and responses were reported on a 5-point Likert scale from 1 (not at all important) to 5 (extremely important). The sum of responses to the 10 questions was used to investigate correlations with other variables.

Attitudes to learning communication skills were measured using the Communication Skills Attitude Scale (CSAS), which has proven internal consistency in measuring medical students' attitudes to learning communication skills[30] and was later adapted for use in student dietitians[23]. The CSAS consists of 26 statements measuring both positive attitudes (e.g.

learning communication skills is interesting, learning communication skills is important because the ability to communicate is a lifelong skill) and negative attitudes (e.g. I can't see the point in learning communication skills, learning communication skills is too easy) and reported on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The sum of the scores of different CSAS statements was used to determine positive attitude (PAS) and negative attitude (NAS) subscales with each subscale having a range of 13-65 and larger values representing more positive or negative attitudes.

Students' confidence in their own communication skills was assessed using statements developed from the Kalamazoo Consensus Statement[31]. This framework was developed with the aim of delineating the essential communication tasks required for effective medical encounters and lists seven competencies of communication: (i) building relationships; (ii) opening the discussion; (iii) gathering information; (iv) understanding the patient's perspective; (v) sharing information; (vi) reaching agreement on problems and plans; and (vii) providing closures. Each competency has a range of sub-competencies. Students were asked to rate their confidence in each of the seven competencies and 24 sub-competencies on a 5-point Likert scale ranging from 1 (not at all confident) to 5 (extremely confident).

Statistical analysis

Where students did not complete an entire questionnaire before or after the teaching, the entire dataset for that student before and after teaching was excluded (n=10). Where data were missing for individual responses in the pre- or post-questionnaire, values were imputed using the median response for that question, and this was performed for 107 (0.7%) data points.

All quantitative data were entered into and analysed using SPSS (Version 24)[32]. Categorical data are expressed as frequencies and percentages and continuous data as mean and standard deviation. Normality of the data was assessed using Kolmogorov Smirnov test. Continuous data were compared using Wilcoxon signed rank tests and paired categorical data were compared using McNemar's test (e.g. confidence before and after teaching). A series of Spearman's rank order correlations were performed to determine the relationship between

sample characteristics, views on the importance of communication skills and attitudes to learning these skills.

Results

Over the three academic years under investigation, 122 student dietitians underwent communication skills training. Of these, 112/122 (91.8%) completed the questionnaire both before and after teaching. The reason for non-completion was predominantly non-attendance when questionnaires were administered. Paired questionnaires were completed by 36 students in 2012-13, 41 in 2013-14 and 35 in 2015-16. Participant details are presented in **Table 1**. Participants were predominantly female (n=99, 88.4%) with a mean (SD) age of 24.4 years (21.1).

Importance of communication skills

Students completed the questionnaire before and after communication skills training. Following teaching, in general scores for the importance of communication skills increased. These were not statistically significant apart from the scores for perceiving communication skills to be important for job satisfaction which increased after communication skills teaching (before 4.0 (SD 0.7) *vs*. after 4.2 (0.7), p = 0.035) (**Table 2**).

Following communication skills teaching, the majority of students rated communication skills as 'very important' or 'extremely important' for all 10 aspects of dietetic practice in the questionnaire (70.5% - 100%) (**Table 2**). All students rated communication skills as 'very important' or 'extremely important' for patient satisfaction and almost all rated communication skills as important for relationships with patients (99.1%) and for job satisfaction (86.6%). Whilst most responses were positive, small numbers of students reported some aspects of communication skills to be less important (i.e. 'not at all, slightly or moderately' important), including 'relationships with colleagues' 17 (15.2%) and 'patient did not attend rates' 26 (23.2%). Fewer students rated communication skills as important for time keeping (70.5%).

Attitudes to learning communication skills

Student dietitians had positive attitudes to learning communication skills. The mean (SD) Positive Attitudes Scale (PAS) score before the training programme was 53.6 (5.3) and after training was 54.0 (5.8)(p=0.162), whereas the Negative Attitudes Scale score was 23.6 (4.3) before training and 23.3 (5.0) after training (p=0.26).

Following communication skills teaching, the vast majority of students either agreed or strongly agreed that 'in order to be a good dietitian I must have good communication skills' (99.2%) and that 'developing my communication skills is just as important as developing my knowledge of dietetics' (86.6%) (**Table 3**).

Whilst the majority held positive attitudes and agreed or strongly agreed that 'learning communication skills is interesting' (88.4%), just over half thought that 'learning communication skills is fun' (58%). Some responses indicated negative attitudes, for example 27 (24.1%) considered that 'communication skills teaching states the obvious and then complicates it' (24.1%) and a quarter indicated they 'found it hard to admit having problems with communication skills' (25.9%).

Before teaching, the sum of responses to questions on the importance of communication skills strongly and positively correlated with PAS score (Spearman's rho, r_s=.609, p=<0.001) and negatively correlated with NAS score (r_s = .438, p=,0.001, n=112). Mann Whitney U tests revealed no difference between either PAS and NAS scores depending upon either sex or programme of study, with the exception of males reporting higher NAS scores (median 26, IQR 5, n=13) than females (median 23, IQR 6, n=99) before teaching (z=-2.664, p=0.018).

After teaching, there was a significant difference in attitude scores according to highest qualification. Students holding a previous Bachelor's degree (or higher) had greater PAS scores (median 56, IQR 7, n=65) than those without a previous degree (median 52, IQR 7, n=47, z=-2.564, p=0.010) and lower NAS (median 22, IQR 6, n=65) than those without a previous degree (median 24, IQR 8, n=47, z=2.095, p=0.036).

Confidence in communication skills

Before communication skills teaching, the proportion of student dietitians feeling 'very or extremely confident' in the seven competencies ranged between 4.5% (reaching agreement

with a patient) and 27.7% (understanding a patient's perspective), whereas after communication skills training this increased to 17.9% (reaching agreement with a patient) and 44.6% (opening a discussion with a patient) (**Table 4**) and there was a statistically significant improvement in confidence ('very or extremely confident) for six of the seven competencies. For student's mean confidence scores, there was a significant improvement in all seven communication competencies after completing communication skills training (**Table 4**).

Meanwhile for the individual sub-competencies, before communication skills teaching 6.3-57.1% of student dietitians felt 'very or extremely confident' in the 24 sub-competencies, whereas after communication skills teaching this increased to 16.1-63.4% (**Table 4**). The increase in numbers feeling 'very or extremely confident' was statistically significant for 18 out of the 24 sub-competencies. After completing communication skills teaching, there was a significant improvement in students' confidence score in performing 22 of the 24 tasks with the exception of task 6d ('identifying additional resources as appropriate') and task 7c ('clarifying follow-up or contact arrangements').

Discussion

There is limited breadth of research on student dietitians' attitudes to communication skills and little systematic evaluation of the impact of communication skills teaching, a deficit our study aimed to address. Our findings indicate that student dietitians have positive attitudes to the importance of communication skills in dietetic practice and to communication skills teaching, and that their confidence in their communication skills increase following training based on experiential learning and the use of simulated patients.

In the present study, the majority of students rated communication skills as 'very or extremely important' for all aspects of dietetic practice included in the questionnaire and 100% agreed that these skills are important for patient satisfaction. These results are similar to those found in a survey of UK dietitians where 98% agreed that communication skills for behaviour change were either 'very or extremely important' when working with clients[18]. That study may have included some students as the survey was sent to all members of the British Dietetic Association but results for students were not presented separately. Student dietitians in our

sample rated communication skills as less important for timekeeping (71% very or extremely important') in comparison to other aspects of practice e.g. patient satisfaction (100% very or extremely important'), which may be due to the early stage of their dietetic education and therefore lack of experience in running a busy clinic. This is supported by the previous survey of UK dietitians where, in those who had undertaken post-registration training in communication skills, some felt timekeeping improved as a result (32%) but a similar number felt timekeeping worsened (29%), with 19% reporting lack of time as a barrier to implementing communication skills[18].

Student dietitians reported positive attitudes to learning communication skills, indeed the PAS score was higher in the current study (mean PAS 54.0, SD 5.8) than that reported by UK student dietitians previously (47.4 - 50.0) albeit that study was undertaken over three years previously, was collected using an anonymous survey and included all stages of dietetic training[23]. Studies have shown a decrease in positive attitudes as students' progress through their programmes[23; 33], potentially linked to a decline in idealism or more socially desirable responses in earlier years. It is possible that attitudes of students in the current study will change as they progress through practice placements and further study, but this was not measured here. Our findings confirm that students' attitudes to training in communication skills are positive when the teaching is based on experiential learning and the use of simulated patients. More positive attitudes to learning communication skills have previously been reported in female students[21; 22], who were highly represented in the current study, thus our findings may be artificially higher. More positive attitudes were seen in students who held a degree or higher qualification. This may indicate that students have developed their interpersonal skills in other educational or employment contexts. There is no conclusive evidence that attitudes are more positive with increasing age[22] but educators should consider the demographics of the student population when developing teaching and learning strategies. There is evidence that social anxiety can contribute to negative attitudes to learning communication skills, particularly among students[34]. Although this wasn't assessed in this study, it is important that educators consider this in the delivery of teaching and feedback. In general, before teaching student dietitians held highly positive attitudes to both communication skills and communication skills training. The limited improvements in attitudes following the teaching may be explained by ceiling effects, in that there was limited capacity for improvement in already positive attitudes. It is important to note that small numbers of students held less positive views about learning communication

skills and the importance of these skills. As these skills are an important component of professional practice and lapses in this area of dietetic practice may impact on student learning, placement outcomes and patient experiences, dietetic education should be strengthened to explore this[2]. Further research is needed to investigate the relationship between attitudes to learning these skills, the impact on students' communication skills and the effectiveness of these skills in impacting patient outcomes.

Students reported increased confidence in their communication skills following communication skills teaching, and this was seen across all competencies and sub-competencies, except for 'clarifying follow-up or contact arrangements' and 'identifying additional resources as appropriate'. These skills were not explicitly addressed in teaching, so this finding is not unexpected. Self-rated confidence was assessed using a tool based on the Kalamazoo Consensus Statement on communication in medical encounters[31]. Assessment tools adapted from this have been used effectively in medical and multidisciplinary education[35; 36] and multi-rater assessment including self-rating of skills[37]. Some caution is needed in interpreting results based on self-rated confidence. Confidence is frequently measured to assess outcomes but a review of confidence measurement scales for dietitians highlighted the need for evidence-based measures[38]. Confidence can have several overlapping meanings and is sometimes used interchangeably with self-perceived competence; however, the latter focuses on an individual's judgement of how they perform against set competency standards whereas confidence can refer to capability to achieve across a spectrum including beyond a competency standard. Furthermore. there are concerns about the use of confidence scales in healthcare students with self-rated confidence not confirmed by objective assessment[39]. In the current study we did not compare self-rated confidence with outcomes of the OSCE.

In teaching communication skills, simulated patients have been used across a range of healthcare disciplines including dietetics to bridge the gap between learning in the academic and practice settings. Practical sessions with actors were included as part of a counselling course in a dietetics programme in the US[25]. In that study, all students who completed the course and attended a focus group evaluation three months later felt confident about counselling patients compared to none of the students who completed an earlier course based

on didactic teaching only[25]. The present study also supports the use of simulated patients in dietetic education, but further research is needed to investigate the effect on students' communication skills and patient outcomes of this resource intensive approach.

Whist the emphasis on communication skills in dietetic curricula has increased, how student dietitians develop competence in communication and therefore how teaching should be delivered and assessed is subject to discussion. Attempts have been made to describe the communication skills dietitians need for effective communication. Four main communication competencies were described in an Australian study[15]; (i) interpersonal communication skill; (ii) non-verbal communication; (iii) professional values; and (iv) counselling skills, that were accompanied by 26 performance skills (e.g. listening, empathy, integrity and respect). No single skill set operated alone, but all need to be applied together for effective counselling.

A qualitative exploration regarding how student dietitians construct competence found they associated the development of competence more with practice placements than university training but that activities such as simulation did prepare students for placement competence[40]. There is some evidence that communication skills are improved through repeat exposure to simulated patients when these skills are then assessed as a series of OSCEs, in particular for students whose skills were less proficient on initial assessment suggesting there may be a ceiling effect to the development of these skills[27].

Dietitians have reported that further training in communication skills is essential post-qualification[19; 41; 42]. Current evidence suggests that there is variation in the standard of communication skills in practice[41] and as an important part of developing competence is exposure to competent performance, this may hinder effective teaching and assessment in the practice setting[40]. Further longitudinal research could explore how skills taught in pre-registration education are further developed in the workplace.

Internationally, dietetic associations are exploring how the profession needs to change considering drivers such as our ageing population, increasing population diversity,

technological innovation and advances in nutrition science[43]. In the UK, the Future Dietitian 2025 project identified the need for wider career opportunities and greater influence for dietitians with prospects for wider scope of practice in public health, foodservice, policy and extended specialist roles[44]. Whilst the current study focusses on communication skills for individual consultations, educators will need to consider the broader interpersonal skills needed for the future workforce. Interpersonal communication has been identified as a key theme in a model defining professionalism[2] but as professionalism is a multi-dimensional construct, dietetic educators will need to consider which teaching, learning and assessment strategies will enable students to develop these skills alongside other personal qualities and behaviours.

The strengths of the present study include the number of respondents, especially for a relatively small discipline such as dietetics, with a high response rate from eligible participants and representation from both undergraduate and postgraduate students across three academic years of communication skills teaching. Validated tools were used where available to assess student's experience and skills development and where not available, tools were developed from the literature on communication skills education. A limitation of the study is the potential for bias with evidence that student evaluations can be influenced by a range of psychodynamic factors and the potential for social desirability bias[45]. The study used self-reported assessment of confidence and did not measure if these were consistent with objective assessment of skills, such as course marks in the OSCEs or subsequent performance on practice placements. Further research could investigate this, comparing self-reported confidence with observed performance, using a valid and reliable tool e.g. DIET-COMMS[41] and also consider how programmatic assessment approaches might be used to assess competence in these skills as they are developed throughout pre-registration training rather than as single point assessment of competence[46]. To best explore how students experience learning about communication skills and how they develop competence in these skills, qualitative methodologies should be considered for future research[40].

Conclusion

This study demonstrated that communication skills teaching based on experiential learning and incorporating practice with simulated patients and OSCEs is associated with positive attitudes to learning and self-rated improvement in confidence in communication skills among student

dietitians. Further research is needed to determine the most effective ways to teach and assess these skills and to explore patient-centred and clinical outcomes.

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. The reporting of this work is compliant with STROBE2 guidelines. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.

References

1. Whitehead K (2015) Changing dietary behaviour: the role and development of practitioner communication. *Proc Nutr Soc* **74**, 177-184.

2. Dart J, McCall L, Ash S *et al.* (2019) Toward a Global Definition of Professionalism for Nutrition and Dietetics Education: A Systematic Review of the Literature. *J Acad Nutr Diet* **119**, 957-971.

3. Academy of Nutrition and Dietetics (2015) Essential Practice Competencies for the Commission on Dietetic Registration's Credentialed Nutritionand Dietetics Practitioners. https://admin.cdrnet.org/vault/2459/web/files/FINAL-CDR_Competency.pdf (accessed 10th May 2019)

4. British Dietetic Association (2013) A Curriculum Framework for the pre-registration education and training of dietitians. https://www.bda.uk.com/training/practice/preregcurriculum (accessed 10th July 2019)

5. Dietitians Association of Australia (2015) National Competency Standards for Dietitians in Australia. https://daa.asn.au/wp-content/uploads/2017/01/NCS-Dietitians-Australia-with-guide-1.0.pdf (accessed 10th May 2019)

6. The Health Foundation (2014) Person-centred care made simple. https://www.health.org.uk/publications/person-centred-care-made-simple (accessed 10th May 2019)

7. Wolfe A (2001) Institute of Medicine Report: crossing the quality chasm: a new health care system for the 21st century. *Policy Polit Nurs Pract* **2**, 233-235.

8. Sladdin I, Chaboyer W, Ball L (2018) Patients' perceptions and experiences of patient-centred care in dietetic consultations. *J Hum Nutr Diet* **31**, 188-196.

9. World Health Organization (2016) Framework on integrated, people-centred health services. http://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_39-en.pdf?ua=1&ua=1 (accessed 10th May 2019)

10. Goodchild CE, Skinner T, Parkin T (2005) The value of empathy in dietetic consultations. A pilot study to investigate its effect on satisfaction, autonomy and agreement. *J Hum Nutr Diet* **18**, 181-185.

11. Hancock RE, Bonner G, Hollingdale R *et al.* (2012) 'If you listen to me properly, I feel good': a qualitative examination of patient experiences of dietetic consultations. *J Hum Nutr Diet* **25**, 275-284.

12. Parkin T, de Looy A, Farrand P (2014) Greater professional empathy leads to higher agreement about decisions made in the consultation. *Patient Educ Couns* **96**, 144-150.
13. Vivanti A, Ash S, Hulcombe J (2007) Validation of a satisfaction survey for rural and urban outpatient dietetic services. *J Hum Nutr Diet* **20**, 41-49.
14. Sladdin I, Ball L, Bull C *et al.* (2017) Patient-centred care to improve dietetic practice: an integrative review. *J Hum Nutr Diet* **30**, 453-470.
15. Cant RP, Aroni RA (2008) Exploring dietitians' verbal and nonverbal communication skills for effective dietitian-patient communication. *J Hum Nutr Diet* **21**, 502-511.
16. Kurtz SM, Silverman J, Draper J (2016) Teaching and learning communication skills in medicine, Second edition. ed., pp. 1 online resource. Boca Raton: CRC Press,.
17. Rapoport L, Perry KN (2000) Do dietitians feel that they have had adequate training in behaviour change methods? *J Hum Nutr Diet* **13**, 287-298.
18. Whitehead K, Langley-Evans SC, Tischler V *et al.* (2009) Communication skills for behaviour change in dietetic consultations. *J Hum Nutr Diet* **22**, 493-500.
19. Cant R, Aroni R (2008) From competent to proficient; nutrition education and counselling competency dilemmas experienced by Australian clinical dietitians in education of individuals. *Nutr Diet* **65**, 84-89.
20. Lu AH, Dollahite J (2010) Assessment of dietitians' nutrition counselling self-efficacy and its positive relationship with reported skill usage. *J Hum Nutr Diet* **23**, 144-153.
21. Anvik T, Grimstad H, Baerheim A *et al.* (2008) Medical students' cognitive and affective attitudes towards learning and using communication skills--a nationwide cross-sectional study. *Med Teach* **30**, 272-279.
22. Rees C, Sheard C (2002) The relationship between medical students' attitudes towards communication skills learning and their demographic and education-related characteristics. *Med Educ* **36**, 1017-1027.
23. Power BT, Lennie SC (2012) Pre-registration dietetic students' attitudes to learning communication skills. *J Hum Nutr Diet* **25**, 189-197.
24. Parry RH, Brown K (2009) Teaching and learning communication skills in physiotherapy: What is done and how should it be done? *Physiotherapy* **95**, 294-301.
25. Stephenson TJ, Mayes, L., Combs, E. M., Webber, K. (2015) Developing communication skills of undergraduate students through innovative teaching approaches. *NACTA Journal* **59**, 313.

26. Kaplonyi J, Bowles KA, Nestel D *et al.* (2017) Understanding the impact of simulated patients on health care learners' communication skills: a systematic review. *Med Educ* **51**, 1209-1219.

27. Gibson SJ, Davidson ZE (2016) An observational study investigating the impact of simulated patients in teaching communication skills in preclinical dietetic students. *J Hum Nutr Diet* **29**, 529-536.

28. Bauer KD, Liou D, Sokolik CA (2015) *Nutrition counseling and education skill development*: Nelson Education.

29. Health Research Authority (2017) Defining Research. http://www.hra-decisiontools.org.uk/research/docs/DefiningResearchTable_Oct2017-1.pdf (accessed 10th July 2019)

30. Rees C, Sheard C, Davies S (2002) The development of a scale to measure medical students' attitudes towards communication skills learning: the Communication Skills Attitude Scale (CSAS). *Med Educ* **36**, 141-147.

31. Makoul G (2001) Essential elements of communication in medical encounters: the Kalamazoo consensus statement. *Acad Med* **76**, 390-393.

32. IBM Corp. (Released 2016) IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.

33. Woloschuk W, Harasym PH, Temple W (2004) Attitude change during medical school: a cohort study. *Med Educ* **38**, 522-534.

34. Laidlaw AH (2009) Social anxiety in medical students: Implications for communication skills teaching. *Med Teach* **31**, 649-654.

35. Rider EA, Hinrichs MM, Lown BA (2006) A model for communication skills assessment across the undergraduate curriculum. *Med Teach* **28**, e127-134.

36. Peterson EB, Calhoun AW, Rider EA (2014) The reliability of a modified Kalamazoo Consensus Statement Checklist for assessing the communication skills of multidisciplinary clinicians in the simulated environment. *Patient Educ Couns* **96**, 411-418.

37. Calhoun AW, Rider EA, Peterson E *et al.* (2010) Multi-rater feedback with gap analysis: an innovative means to assess communication skill and self-insight. *Patient Educ Couns* **80**, 321-326.

38. Buttenshaw K, Ash S, Shakespeare-Finch J (2017) Development and validation of the Dietetic Confidence Scale for working with clients experiencing psychological issues. *Nutr Diet* **74**, 36-45.

39. Sears K, Godfrey CM, Luctkar-Flude M *et al.* (2014) Measuring competence in healthcare learners and healthcare professionals by comparing self-assessment with objective structured clinical examinations: A systematic review. *JBI Database of Systematic Reviews and Implementation Reports* **12**, 221-272.
40. Palermo C, Dart J, Begley A *et al.* (2018) Dietetics students' construction of competence through assessment and placement experiences. *Nutr Diet* **75**, 307-315.
41. Whitehead KA, Langley-Evans SC, Tischler VA *et al.* (2014) Assessing communication skills in dietetic consultations: the development of the reliable and valid DIET-COMMS tool. *J Hum Nutr Diet* **27**, 321-332.
42. Notaras S, Mak M, Wilson N (2018) Advancing practice in dietitians' communication and nutrition counselling skills: a workplace education program. *J Hum Nutr Diet* **31**, 725-733.
43. Rhea M, Bettles C (2012) Future changes driving dietetics workforce supply and demand: Future scan 2012-2022. *J Acad Nutr Diet* **112**, S10-S24.
44. Hickson M, Child J, Collinson A (2018) Future dietitian 2025: informing the development of a workforce strategy for dietetics. *J Hum Nutr Diet* **31**, 23-32.
45. Spooren P, Brockx B, Mortelmans D (2013) On the Validity of Student Evaluation of Teaching: The State of the Art. *Rev Educ Res* **83**, 598-642.
46. Palermo C, Gibson SJ, Dart J *et al.* (2017) Programmatic Assessment of Competence in Dietetics: A New Frontier. *J Acad Nutr Diet* **117**, 175-179.

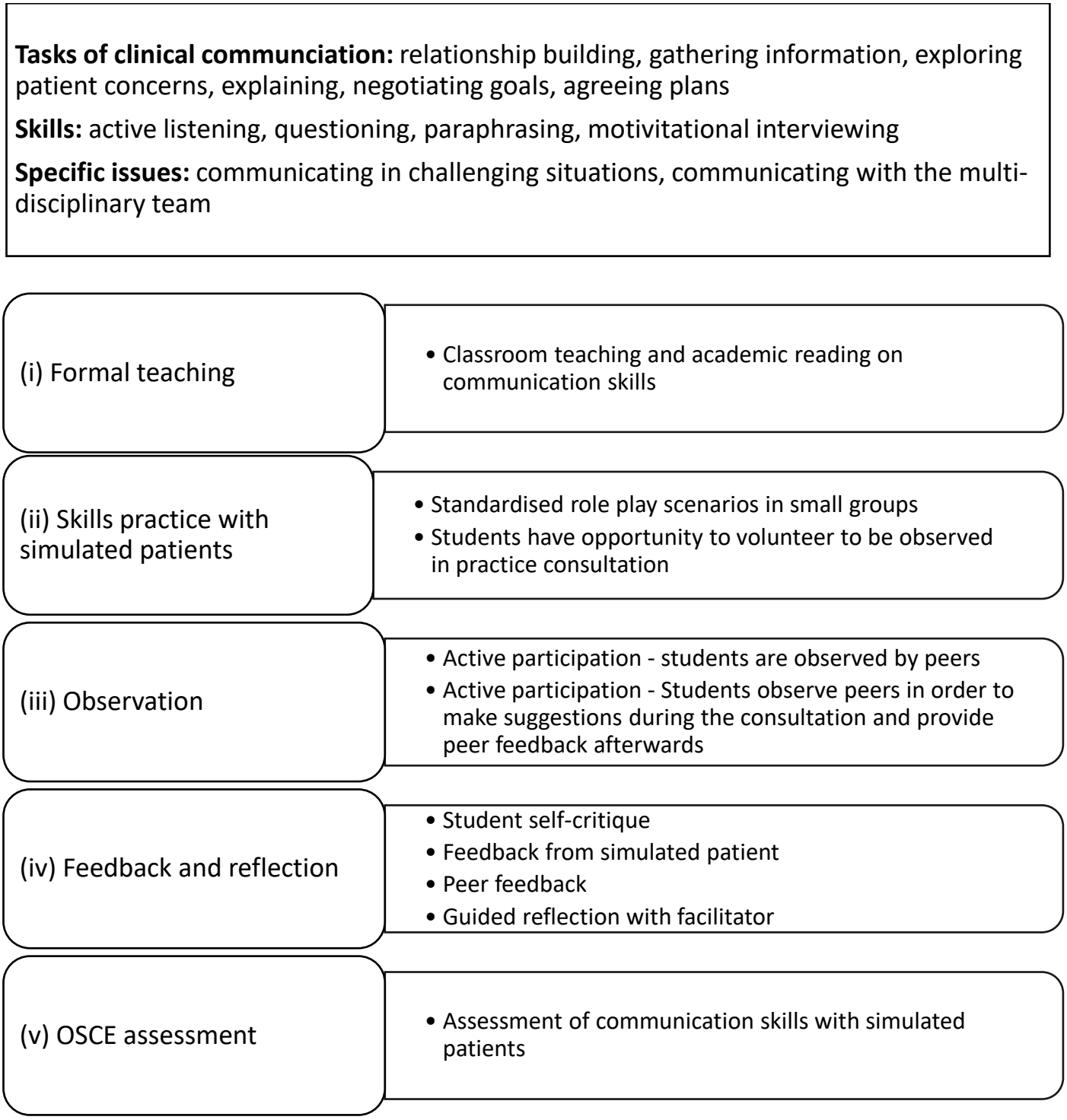

Figure 1 – Overview of model of communication skills teaching. OSCE, objective structured clinical exams.

Table 1 – Participant characteristics of 112 student dietitians who completed communication skills training

	Student characteristics (n=112)
Gender, n (%)	
Male	13 (11.6)
Female	99 (88.4)
Age, years, mean (SD)	24.4 (21.1)
Programme, n (%)	
BSc Nutrition and Dietetics	67 (59.8)
MSc/PGDip Dietetics	45 (40.2)
Highest educational qualification, n (%)	
A level	43 (38.4)
University access course	4 (3.6)
BSc/BA	47 (42.0)
MSc/MA	17 (15.2)
PhD	1 (0.9)
Previous healthcare experience, n (%)	40 (35.7)

Table 2 – Attitudes to the importance of communication skills in 112 student dietitians

	After communication skills training						Attitudes score[1]		
How important are communication skills for behaviour change in relation to:	**Not at all important** n (%)	**Slightly important** n (%)	**Moderately important** n (%)	**Very important** n (%)	**Extremely important** n (%)	**Either very or extremely important** n (%)	**Before training**[1] mean (SD)	**After training** mean (SD)	**p value**[2]
Relationships with patients	0 (0)	1 (0.9)	0 (0)	22 (19.6)	89 (79.5)	111 (99.1)	4.7 (0.5)	4.8 (0.5)	0.225
Relationships with colleagues	0 (0)	5 (4.5)	12 (10.7)	39 (34.8)	56 (50.0)	95 (84.8)	4.2 (0.9)	4.3 (0.8)	0.131
Job satisfaction	1 (0.9)	0 (0)	14 (12.5)	59 (52.7)	38 (33.9)	97 (86.6)	4.0 (0.7)	4.2 (0.7)	0.035
Patient satisfaction	0 (0)	0 (0)	0 (0)	19 (17)	93 (83)	112 (100)	4.8 (0.4)	4.8 (0.4)	0.371
Patient "did not attend" rates	1 (0.9)	4 (3.6)	21 (18.8)	34 (30.4)	52 (46.4)	86 (76.8)	4.1 (0.8)	4.2 (0.9)	0.112
Patient clinical outcomes	1 (0.9)	0 (0)	7 (6.3)	48 (42.9)	56 (50.0)	104 (92.9)	4.4 (0.6)	4.4 (0.7)	0.716
Your confidence in client interviews	0 (0)	0 (0)	2 (1.8)	33 (29.5)	77 (68.8)	110 (98.2)	4.6 (0.6)	4.7 (0.5)	0.186
Your time keeping in client interviews	5 (4.5)	5 (4.5)	23 (20.5)	36 (32.1)	43 (38.4)	79 (70.5)	3.9 (0.9)	4.0 (1.1)	0.633
Coping with challenging clients	0 (0)	3 (2.7)	1 (0.9)	22 (19.6)	86 (76.8)	108 (96.4)	4.6 (0.6)	4.7 (0.6)	0.255
Obtaining an accurate diet history	0 (0)	6 (5.4)	8 (7.1)	45 (40.2)	53 (47.3)	98 (87.5)	4.2 (0.9)	4.3 (0.8)	0.488

[1] Attitudes score is the mean (SD) score from each question on the 5-point Likert scale for all participants before or after communication skills training
[2] Wilcoxon signed rank test

Table 3 – Attitudes to learning communication skills in 112 student dietitians

	Attitudes after communication skills training					Attitude score[1]		
	Strongly disagree n (%)	**Disagree** n (%)	**Neutral** n (%)	**Agree** n (%)	**Strongly Agree** n (%)	**Before training** mean (sd)	**After training** mean (sd)	**p value**[2]
In order to be a good dietitian I must have good communication skills	1 (0.9)	0 (0)	0 (0)	6 (5.4)	105 (93.8)	5.0 (0.2)	4.9 (0.4)	0.206
I can't see the point in learning communication skills	85 (75.9)	19 (17.0)	3 (2.7)	2 (1.8)	3 (2.7)	1.4 (0.6)	1.4 (0.9)	0.884
Nobody is going to fail their dietetics degree for poor communication skills	28 (25.0)	57 (50.9)	22 (19.6)	3 (2.7)	2 (1.8)	2.1 (0.8)	2.1 (0.9)	0.525
Developing my communication skills is just as important as developing my knowledge of dietetics	1 (0.9)	6 (5.4)	8 (7.1)	42 (37.5)	55 (49.1)	4.3 (0.7)	4.3 (0.9)	0.935
Learning communication skills has helped or will help me respect patients	0 (0)	3 (2.7)	11 (9.8)	46 (41.1)	52 (46.4)	4.2 (0.7)	4.3 (0.8)	0.234
I haven't got time to learn communication skills	47 (42.0)	50 (44.6)	9 (8.0)	6 (5.4)	0 (0)	1.8 (0.7)	1.8 (0.8)	0.72
Learning communication skills is interesting	0 (0)	3 (2.7)	10 (8.9)	61 (54.5)	38 (33.9)	4.1 (0.8)	4.2 (0.7)	0.042
I can't be bothered to turn up to sessions on communication skills	77 (68.8)	27 (24.1)	8 (7.1)	0 (0)	0 (0)	1.6 (0.7)	1.4 (0.6)	0.003
Learning communication skills has helped or will help facilitate my team-working skills	1 (0.9)	2 (1.8)	11 (9.8)	56 (50.0)	42 (37.5)	4.2 (0.7)	4.2 (0.8)	0.989
Learning communication skills has improved or will improve my ability to communicate with patients	0 (0)	1 (0.9)	0 (0)	35 (31.3)	76 (67.9)	4.6 (0.6)	4.7 (0.5)	0.101
Communication skills teaching states the obvious and then complicates it	8 (7.1)	51 (45.5)	26 (23.2)	25 (22.3)	2 (1.8)	2.5 (0.8)	2.7 (1.0)	0.029
Learning communication skills is fun	0 (0)	8 (7.1)	39 (34.8)	55 (49.1)	10 (8.9)	3.4 (0.6)	3.6 (0.8)	0.011
Learning communication skills is too easy	25 (22.3)	67 (59.8)	18 (16.1)	1 (0.9)	1 (0.9)	2.2 (0.7)	2.0 (0.7)	0.003
Learning communication skills has helped or will help me respect my colleagues	1 (0.9)	7 (6.3)	25 (22.3)	59 (52.7)	20 (17.9)	3.8 (.8)	3.8 (0.8)	0.498
I find it difficult to trust information about communication skills given to me by dietitians who do not work in a clinical environment	30 (26.8)	64 (57.1)	12 (10.7)	6 (5.4)	0 (0)	2.0 (0.8)	2.0 (0.8)	0.36

Learning communication skills has helped or will help me recognise patients' rights regarding confidentiality and informed consent	0 (0)	10 (8.9)	20 (17.9)	64 (57.1)	18 (16.1)	3.9 (0.8)	3.8 (0.8)	0.502
Communication skills teaching would have a better image if it sounded more like a science subject	28 (25.0)	54 (48.2)	19 (17.0)	11 (9.8)	0 (0)	2.2 (0.8)	2.1 (0.9)	0.598
When applying for dietetics, I thought it was a really good idea to learn communication skills	1 (0.9)	7 (6.3)	19 (17.0)	56 (50.0)	29 (25.9)	4.0 (0.8)	3.9 (0.9)	0.064
I don't need good communication skills to be a dietitian	94 (83.9)	17 (15.2)	0 (0)	0 (0)	1 (0.9)	1.2 (0.4)	1.2 (0.5)	0.67
I find it hard to admit to having problems with my communication skills	7 (6.3)	60 (53.6)	16 (14.3)	28 (25.0)	1 (0.9)	2.6 (1.0)	2.6 (1.0)	0.087
I think it's really useful learning communication skills on the dietetics degree	1 (0.9)	1 (0.9)	5 (4.5)	46 (41.1)	59 (52.7)	4.5 (0.6)	4.4 (0.7)	0.262
My ability to pass exams will get me through my dietetics degree rather than my ability to communicate	21 (18.8)	48 (42.9)	20 (17.9)	19 (17.0)	4 (3.6)	2.4 (0.9)	2.4 (1.1)	0.5
Learning communication skills is applicable to learning dietetics	1 (0.9)	0 (0)	3 (2.7)	38 (33.9)	70 (62.5)	4.5 (0.6)	4.6 (0.6)	0.044
I find it difficult to take learning communication skills seriously	45 (40.2)	52 (46.4)	10 (8.9)	4 (3.6)	1 (0.9)	1.8 (0.7)	1.8 (0.8)	0.347
Learning communication skills is important because my ability to communicate is a lifelong skill	1 (0.9)	1 (0.9)	1 (0.9)	37 (33.0)	72 (64.3)	4.6 (0.5)	4.6 (0.7)	0.056
Learning communication skills should be left to psychology students, not dietetic students	76 (67.9)	34 (30.4)	1 (0.9)	0 (0)	1 (0.9)	1.3 (0.5)	1.4 (0.6)	0.739

[1] Attitudes score is the mean (SD) score from each question on the 5-point Likert scale for all participants before or after communication skills training

[2] Wilcoxon signed rank test

Table 4 – Confidence in communication skills in 112 student dietitians before and after completing communication skills teaching

Competency and sub-competency		Confidence in communication skills (n=112)					Very or extremely	p value[1]	Confidence score	p value[2]
		Not at all	Slightly	Moderately	Very	Extremely				
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		mean (SD)	
(C1) Building and sustaining a trusting relationship with a patient	Pre	8 (7.1)	29 (25.9)	58 (51.8)	14 (12.5)	3 (2.7)	17 (15.2)	0.001	2.8 (0.9)	<0.001
	Post	0 (0)	11 (9.8)	65 (58.0)	27 (24.1)	9 (8.0)	36 (32.1)		3.3 (0.8)	
(1a) Greeting and showing interest in a patient as a person	Pre	2 (1.8)	17 (15.2)	29 (25.9)	57 (50.9)	7 (6.3)	64 (57.1)	0.324	3.5 (0.9)	<0.001
	Post	0 (0)	5 (4.5)	36 (32.1)	44 (39.3)	27 (24.1)	71 (63.4)		3.8 (0.9)	
(1b) Using words that show care and concern throughout the patient interview	Pre	7 (6.3)	20 (17.9)	56 (50.0)	23 (20.5)	6 (5.4)	29 (25.9)	<0.001	3 (0.9)	<0.001
	Post	2 (1.8)	6 (5.4)	45 (40.2)	44 (39.3)	15 (13.4)	59 (52.7)		3.6 (0.9)	
(1c) Using tone, pace, eye contact and posture that show care and concern	Pre	5 (4.5)	16 (14.3)	46 (41.1)	37 (33.0)	8 (7.1)	45 (40.2)	<0.001	3.2 (0.9)	<0.001
	Post	0 (0)	5 (4.5)	36 (32.1)	54 (48.2)	17 (15.2)	71 (63.4)		3.7 (0.8)	
(C2) Opening the discussion with a patient	Pre	10 (8.9)	26 (23.2)	62 (55.4)	13 (11.6)	1 (0.9)	14 (12.5)	<0.001	2.7 (0.8)	<0.001
	Post	0 (0)	9 (8.0)	53 (47.3)	39 (34.8)	11 (9.8)	50 (44.6)		3.5 (0.8)	
(2a) Allowing a patient to complete opening statements without interruption	Pre	3 (2.7)	28 (25.0)	50 (44.6)	28 (25.0)	3 (2.7)	31 (27.7)	<0.001	3.0 (0.8)	<0.001
	Post	0 (0)	7 (6.3)	47 (42.0)	45 (40.2)	13 (11.6)	58 (51.8)		3.6 (0.8)	
(2b) Asking a patient "Is there anything else?" to elicit full set of concerns	Pre	4 (3.6)	25 (22.3)	48 (42.9)	32 (28.6)	3 (2.7)	35 (31.3)	<0.001	3 (0.9)	<0.001
	Post	0 (0)	13 (11.6)	41 (36.6)	42 (37.5)	16 (14.3)	58 (51.8)		3.5 (0.9)	
(2c) Explaining and/ or negotiating an agenda for the visit	Pre	13 (11.6)	51 (45.5)	34 (30.4)	12 (10.7)	2 (1.8)	14 (12.5)	0.001	2.5 (0.9)	<0.001
	Post	3 (2.7)	25 (22.3)	52 (46.4)	29 (25.9)	3 (2.7)	32 (28.6)		3.0 (0.8)	
(C3) Gathering information from a patient	Pre	8 (7.1)	42 (37.5)	55 (49.1)	5 (4.5)	2 (1.8)	7 (6.3)	<0.001	2.6 (0.8)	<0.001
	Post	1 (0.9)	16 (14.3)	72 (64.3)	22 (19.6)	1 (0.9)	23 (20.5)		3.1 (0.6)	
(3a) Beginning with a patient's story and using open ended questions to gather information	Pre	10 (8.9)	46 (41.1)	45 (40.2)	10 (8.9)	1 (0.9)	11 (9.8)	<0.001	2.5 (0.8)	<0.001
	Post	2 (1.8)	18 (16.1)	54 (48.2)	34 (30.4)	4 (3.6)	38 (33.9)		3.2 (0.8)	
(3b) Clarifying details with more specific or close-ended questions	Pre	13 (11.6)	45 (40.2)	40 (35.7)	13 (11.6)	1 (0.9)	14 (12.5)	0.001	2.5 (0.9)	<0.001
	Post	3 (2.7)	15 (13.4)	61 (54.5)	29 (25.9)	4 (3.6)	33 (29.5)		3.1 (0.8)	
(3c) Summarising and giving a patient the opportunity to correct or add information	Pre	12 (10.7)	40 (35.7)	45 (40.2)	14 (12.5)	1 (0.9)	15 (13.4)	0.009	2.6 (0.9)	<0.001
	Post	4 (3.6)	23 (20.5)	53 (47.3)	25 (22.3)	7 (6.3)	32 (28.6)		3.1 (0.9)	
(3d) Transitioning effectively to additional questions and new topics	Pre	20 (17.9)	47 (42.0)	38 (33.9)	7 (6.3)	0 (0)	7 (6.3)	0.027	2.3 (0.8)	<0.001
	Post	6 (5.4)	33 (29.5)	55 (49.1)	17 (15.2)	1 (0.9)	18 (16.1)		2.8 (0.8)	
(C4) Understanding a patient's perspective	Pre	4 (3.6)	25 (22.3)	52 (46.4)	29 (25.9)	2 (1.8)	31 (27.7)	0.008	3.0 (0.8)	<0.001
	Post	1 (0.9)	8 (7.1)	57 (50.9)	38 (33.9)	8 (7.1)	46 (41.1)		3.4 (0.8)	
(4a) Asking about life events, circumstances, other people that affect a patient's concerns	Pre	13 (11.6)	37 (33.0)	48 (42.9)	13 (11.6)	1 (0.9)	14 (12.5)	<0.001	2.6 (0.9)	<0.001
	Post	2 (1.8)	17 (15.2)	55 (49.1)	34 (30.4)	4 (3.6)	38 (33.9)		3.2 (0.8)	
(4b) Eliciting a patient's beliefs and expectations about their dietary treatment	Pre	17 (15.2)	34 (30.4)	46 (41.1)	14 (12.5)	1 (0.9)	15 (13.4)	<0.001	2.5 (0.9)	<0.001
	Post	1 (0.9)	19 (17.0)	53 (47.3)	35 (31.3)	4 (3.6)	39 (34.8		3.2 (0.8)	
(4c) Responding explicitly to a patient's statements about ideas and feelings	Pre	18 (16.1)	47 (42.0)	32 (28.6)	14 (12.5)	1 (0.9)	15 (13.4)	0.002	2.4 (0.9)	<0.001
	Post	2 (1.8)	21 (18.8)	57 (50.9)	30 (26.8)	2 (1.8)	32 (28.6)		3.1 (0.8)	
(C5) Sharing information with patients	Pre	10 (8.9)	38 (33.9)	50 (44.6)	13 (11.6)	1 (0.9)	14 (12.5)	0.143	2.6 (0.8)	<0.001
	Post	3 (2.7)	24 (21.4)	64 (57.1)	19 (17.0)	2 (1.8)	21 (18.8)		2.9 (0.8)	

(5a) Assessing a patient's understanding of problem and desire for more information	Pre Post	10 (8.9) 1 (0.9)	46 (41.1) 20 (17.9)	38 (33.9) 59 (52.7)	18 (16.1) 27 (24.1)	0 (0) 5 (4.5)	18 (16.1) 32 (28.6)	0.034	2.6 (0.9) 3.1 (0.8)	<0.001
(5b) Explaining using words that a patient can understand	Pre Post	11 (9.8) 4 (3.6)	34 (30.4) 26 (23.2)	43 (38.4) 49 (43.8)	22 (19.6) 26 (23.2)	2 (1.8) 7 (6.3)	24 (21.4) 33 (29.5)	0.122	2.7 (0.9) 3.1 (0.9)	0.001
(5c) Asking if a patient has any questions	Pre Post	3 (2.7) 0 (0)	17 (15.2) 9 (8.0)	39 (34.8) 34 (30.4)	45 (40.2) 50 (44.6)	8 (7.1) 19 (17.0)	53 (47.3) 69 (61.6)	0.009	3.3 (0.9) 3.7 (0.9)	<0.001
(C6) Reaching agreement with a patient	Pre Post	7 (6.3) 4 (3.6)	43 (38.4) 24 (21.4)	57 (50.9) 64 (57.1)	5 (4.5) 19 (17.0)	0 (0) 1 (0.9)	5 (4.5) 20 (17.9)	0.001	2.5 (0.7) 2.9 (0.8)	<0.001
(6a) Including a patient in choices and decisions to the extent they desire	Pre Post	6 (5.4) 3 (2.7)	38 (33.9) 19 (17.0)	45 (40.2) 53 (47.3)	18 (16.1) 33 (29.5)	5 (4.5) 4 (3.6)	23 (20.5) 37 (33.0)	0.290	2.8 (0.9) 3.1 (0.8)	0.001
(6b) Checking for mutual understanding of the problem and plan	Pre Post	6 (5.4) 3 (2.7)	36 (32.1) 17 (15.2)	48 (42.9) 54 (48.2)	17 (15.2) 33 (29.4)	5 (4.5) 5 (4.5)	22 (19.6) 38 (33.9)	0.110	2.8 (0.9) 3.2 (0.8)	<0.001
(6c) Asking about a patient's ability to follow the agreed upon plan	Pre Post	9 (8.0) 4 (3.6)	34 (30.4) 22 (19.6)	46 (41.1) 60 (53.6)	21 (18.8) 22 (19.6)	2 (1.8) 4 (3.6)	23 (20.5) 26 (23.2)	0.711	2.8 (0.9) 3.0 (0.8)	0.004
(6d) Identifying additional resources as appropriate	Pre Post	13 (11.6) 8 (7.1)	27 (24.1) 29 (25.9)	59 (52.7) 48 (42.9)	11 (9.8) 26 (23.2)	2 (1.8) 1 (0.9)	13 (11.6) 27 (24.1)	0.009	2.7 (0.9) 2.9 (0.9)	0.69
(C7) Closing the discussion	Pre Post	12 (10.7) 5 (4.5)	50 (44.6) 13 (11.6)	36 (32.1) 54 (48.2)	13 (11.6) 35 (31.3)	1 (0.9) 5 (4.5)	14 (12.5) 40 (35.7)	<0.001	2.5 (0.9) 3.2 (0.9)	<0.001
(7a) Asking if a patient has questions, concerns or other issues	Pre Post	4 (3.6) 1 (0.9)	36 (32.1) 14 (12.5)	45 (40.2) 39 (34.8)	24 (21.4) 47 (42.0)	3 (2.7) 11 (9.8)	27 (24.1) 58 (51.8)	<0.001	2.9 (0.9) 3.5 (0.9)	<0.001
(7b) Summarising problems/concerns and plan	Pre Post	12 (10.7) 3 (2.7)	33 (29.5) 23 (20.5)	48 (42.9) 56 (50.0)	16 (14.3) 25 (22.3)	3 (2.7) 5 (4.5)	19 (17.0) 30 (26.8)	0.090	2.7 (0.9) 3.1 (0.9)	0.001
(7c) Clarifying follow-up or contact arrangements	Pre Post	4 (3.6) 4 (3.6)	29 (25.9) 24 (21.4)	48 (42.9) 53 (47.3)	27 (24.1) 24 (21.4)	4 (3.6) 7 (6.3)	31 (27.7) 31 (27.7)	1.000	3.0 (0.9) 3.1 (0.9)	0.517
(7d) Acknowledging a patient and closing the interview	Pre Post	6 (5.4) 4 (3.6)	37 (33.0) 15 (13.4)	37 (33.0) 46 (41.1)	29 (25.9) 36 (32.1)	3 (2.7) 11 (9.8)	32 (28.6) 47 (42.0)	0.280	3 (1.0) 3.3 (1.0)	<0.001

Pre refers to student responses before communication skills teaching, Post refers to responses after completing communication skills teaching

1 McNemars test of paired categorical variables comparing 'very or extremely confident' between pre- and post- communication skills teaching

2 Wilcoxon signed rank test of paired continuous variables comparing mean score between pre- and post- communication skills training