# Improving student learning of pelvic examinations through the Clinical Teaching Associate tutorial

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## Abstract

***Background:*** Medical training usually provides limited opportunities to learn to perform pelvic examination, and students frequently cite a lack of confidence in performing this examination. Learning the technical and communication skills involved in performing a pelvic examination is complex; therefore, there is a need to explore the impact of specialised approaches to teaching pelvic examination during medical training. In this study, we examined the immediate and long-term impact of a professional patient tutorial in teaching medical students to perform pelvic examination.

***Method:*** Students ($n$ = 215) learned pelvic examination by watching an interactive CD, practising on a manikin and participating in the Clinical Teaching Associate (CTA) tutorial. Students completed questionnaires before and after the tutorial and at the end of the course. These questionnaires assessed experience with and attitudes towards performing pelvic examination and self-rated technical and communication skills.

***Results:*** After the tutorial, students were more confident, less anxious and embarrassed, and less worried about hurting the patient during a pelvic examination (all $p < 0.001$). Students rated their communication and technical skills higher at the end of the CTA tutorial. From the end of the CTA tutorial to the end of the course, communication skills ratings remained stable, but student ratings of technical skill decreased.

***Conclusion:*** The CTA tutorial provides individualised instruction and feedback in pelvic examination to medical students, with immediate and long-term benefits to students' self-reported skills. Medical students have limited opportunities for learning pelvic examination in clinical contexts. Demonstrating that alternative training methods have long-lasting benefits on students' capacity to competently perform these examinations is important.

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## Introduction

An important outcome of medical training is performing a pelvic examination competently, but medical training may not always provide effective teaching and learning opportunities. Medical students have few opportunities to learn and practise sensitive physical examinations (e.g., pelvic, breast and rectal examinations) during medical training. As a result, medical students often lack confidence in their ability to perform these examinations competently (Abraham, 2008; Carr & Carmody, 2004). Learning during clinical training may be difficult because of limited access to patients for teaching and learning, and because patients are less likely to consent to sensitive examinations as an educational exercise (Fortier, Hahn, Trueman, & Reid, 2006; Mavis, Vasilenko, Schnuth, Marshall, & Jeffs, 2006).

Learning pelvic examination is complex. Many approaches, such as practising on manikins or on women under anaesthesia, are not realistic models for conscious patients. These methods also do not provide opportunities for students to learn examination-specific communication skills. Practising with clinical patients may also not provide the most effective learning outcomes. Time in clinics is limited, and patients are not trained to give feedback to learners (Hunter, McLachlan, Ikeda, Harrison, & Galletly, 2014). It is important that medical graduates leave their training with appropriate technical and communication skills to perform a pelvic examination effectively. As there are limited opportunities in clinical settings to learn and practise pelvic examinations, it is important to develop and evaluate methodologies to teach these skills in alternative settings.

Different approaches to teaching pelvic examination have been developed to increase opportunities for students to learn, to enable students to practise these skills under supervision and to offer students feedback designed to facilitate learning. Research has shown positive outcomes when trained laywomen (sometimes called professional patients, gynaecological teaching associates or clinical teaching associates) teach students the examination technique and associated communication skills (Dilaveri, Szostek, Wang, & Cook, 2013; Hendrickx et al., 2009; Wånggren, Fianu Jonassen, Andersson, Pettersson, & Gemzell-Danielsson, 2010). Medical students rate these programs highly (Carr & Carmody, 2004; Plauche & Baugniet-Nebrija, 1985) and may become more skilled than students taught using other approaches (Dilaveri et al., 2013; Kleinman, Hage, Hoole, & Kowlowitz, 1996). For instance, Siwe, Wijma, Stjernquist and Wijma (2007) compared the outcomes for students learning pelvic examination with professional patients versus clinical patients. They found that students who learned with professional patients were more skilful, performed more pelvic examinations during their clerkship, reported lower distress after learning the examination and reported receiving more guidance during learning compared with students who learned with clinical patients.



ISSN 1442-1100

The positive impact of both professional and real patient involvement in teaching and assessing intimate examination skills was confirmed by Jha, Setna, Al-Hitty, Quinton and Roberts' (2010) systematic review. Patient involvement was associated with short-term positive impacts for students, such as satisfaction with the teaching approach, improved understanding of the examination and improved technical skills. The efficacy of curriculum interventions to teach students skills in pelvic examination appears to be closely related to the degree to which teaching incorporates feedback (Dilaveri et al., 2013). Teaching pelvic examination using professional patients who take an active teaching role allows students to practise the examination and gain feedback on their examination technique and communication skills from women experiencing the examination. It also encourages students to develop unique insights into the experience of the examination from the patient's perspective.

Research is relatively scarce on the use of professional patients to teach gynaecological examinations, and there is little evidence of the long-term benefits of programs where laywomen teach medical students pelvic examination technique and communication skills (Dilaveri et al., 2013). Research has focused on short-term performance improvements rather than considering whether such programs have long-term benefits. The degree to which a professional patient program may change student attitudes towards performing pelvic examination has also not been considered, nor has there been any research focused on students' self-evaluation of different aspects of their technical and communication skills in performing pelvic examination.

### *Context*

Medical students at The University of Melbourne complete a three-stage approach to learning pelvic examination during their clinical training. All students watch an interactive CD *Sensitive Examination Technique* (The University of Melbourne, 2006), which explores women's attitudes towards the examination and provides an example of the technical and communication skills required for the examination. After this introduction to the examination, students practise the examination on a manikin. Finally, students participate in the compulsory 3-hour Clinical Teaching Associate (CTA) tutorial. The CTA program was founded in 2000 and, since then, has been developed significantly to incorporate extensive training for prospective and current CTAs and a model of learner feedback that provides support with challenge and constructive suggestions for improvement. Students in the program are taught by women from the community who are trained to demonstrate appropriate communication and technical skills when performing a pelvic examination. These women also provide guidance and feedback to students on the technical, interpersonal and communication skills required in gynaecological examinations (Fairbank, 2009; Fairbank, Reid, & Minzenmay, 2014). CTAs teach medical students speculum and bimanual examination. Pap smears are not taken in the CTA tutorial, as they are taught in another tutorial, but CTAs suggest that students think about what equipment they would need to take out if they were performing a Pap test. Women from the CTA program also teach speculum and bimanual examinations to groups outside the medical course, for instance, medical students from other universities, international medical graduates and nurses training as nurse practitioners.



ISSN 1442-1100

The program employs anywhere between 16–20 CTAs at any time, many with professional backgrounds in health (e.g., nursing) or education. Such backgrounds are not mandatory, however, and women are selected for the program because they demonstrate an aptitude and enthusiasm for teaching medical students, comfort with their bodies and with the examination, high-level communication skills and a capacity to work well as a member of a team. Working as a CTA is a challenging role, and recruiting for the program—through community health centres, the simulated patient program and through word-of-mouth—is an ongoing process (Fairbank et al., 2014).

In each tutorial, there are two CTAs for every student pair, providing opportunities for immediate and individualised feedback on performance. CTAs manage all aspects of the tutorial, with no clinician present during the session. Each tutorial begins with an introduction followed by a demonstration. In the introduction, an experienced CTA takes the role of doctor and the other CTA performs the patient role. Together, they demonstrate the desired technical and communication skills for performing the pelvic examination. After the introduction, role plays are undertaken with the two students and two CTAs. One CTA performs the patient role and the other CTA acts as a "buddy" who looks after both the patient and the student. Each student practises the examination once with the patient CTA, and at the end of the tutorial, the students receive individual feedback from both the patient and buddy. The CTA who was examined provides feedback to the student largely focused on communication skills from the patient perspective, while the buddy focuses her feedback on the student's technical skills. CTAs acknowledge what students did well, providing specific examples; identify areas for improvement; and provide specific and constructive suggestions while engaging students in a dialogue about their performance, which encourages self-reflection by students.

At the time of this study, all medical students completed 5 semesters of clinical training at the end of the course, with undergraduate students completing 3½ years of preclinical education and graduate students completing 2 years of preclinical education. All students undertook the CTA tutorial in their women's health rotation during either their third or fourth semester of clinical training. The current study explored the impact of participating in the CTA tutorial on students' attitudes towards performing pelvic examination (e.g., their confidence, anxiety and perceptions of the difficulty of performing the examination) and students' assessments of their communication and technical skills in performing a pelvic examination, both immediately after the tutorial and at the end of the medical course (6–15 months after participating in the CTA tutorial).

## Methods

### *Design*

The current research comprised three phases. In the first phase, research participants completed a short questionnaire at the beginning of their CTA tutorial. The pre-tutorial questionnaire gathered demographic information (gender, whether students were Australian or international students and whether they were graduate or undergraduate students), whether participants had previous experience in performing pelvic examinations on either a patient or a manikin, participants' attitudes towards performing a pelvic examination (e.g., I am confident about performing pelvic



ISSN 1442-1100

examinations; I feel embarrassed about performing pelvic examinations) and global ratings of their expertise in communication and technical skills in performing pelvic examinations (on a 5-point scale where 1 = *poor* and 5 = *very good*).

In the second phase, students completed a questionnaire immediately after the CTA tutorial. The post-tutorial questionnaire asked respondents to rate the effectiveness of the CTA tutorial and their attitudes towards performing a pelvic examination, and to report their confidence and ability in communication and technical skills immediately after completing the training. CTAs also rated students' technical and communication skills at the end of the CTA tutorial to determine the reliability of student ratings. The final phase of the research occurred at the end of the medical course, 6–15 months after students had completed the CTA tutorial. Students completed the final questionnaire during the examination period at the end of the medical course. The final questionnaire had the same structure as the immediate post-tutorial questionnaire and asked students to rate their attitudes towards performing a pelvic examination and their confidence and ability in communication and technical skills at the end of their medical training.

### *Data collection*

CTAs, who were not members of the research team, invited students to participate in the research at the beginning of the CTA tutorial. Prior to completing the final questionnaire at the end of the medical course, researchers reminded students that completing the questionnaire was part of the *Improving Student Learning of Pelvic Examination* research study and was relevant only to those students who had consented to participate in the original study. Participants recorded their student identification number on each questionnaire to enable data linkage across the three measures in the study. After data files were merged, student identifiers were replaced with a non-identifiable code. The research received ethics approval from the Human Ethics Research Committee of The University of Melbourne (approval number 1136346.1).

### *Data analyses*

We used repeated measures analyses of variance (ANOVA) to explore variation in student attitudes towards performing pelvic examination and their technical and communication skills in performing a pelvic examination across the three measurement occasions (before and after the CTA tutorial and at the end of the course). Effect size was measured using partial eta squared ($\eta_p^2$).

## Results

### *Participants and setting*

Two hundred and fifteen students (67% of the cohort) participated in all three phases of the research. An additional 61 students were not included in the analyses because they completed only Phase 1 and 2 of the research. There were 111 male (51.9%) and 103 female (48.1%) participants (gender was not specified by one student), and the majority of participants were Australian residents (69.9%) rather than international students



ISSN 1442-1100

(30.1%). Most were undertaking the medical course as an undergraduate student (78.6%), with the remainder completing a graduate course (21.4%). These proportions are similar to the complete cohort of students enrolled in the medical course.

CTA tutorials were held in the outpatient clinics of two major public women's hospitals in Melbourne, Royal Women's Hospital and Mercy Hospital, during the women's health rotation. Students undertook their women's health rotation in either the third or fourth semester of clinical training, with students allocated to the tutorial from Weeks 1 to 14 of the semester. Ninety-seven participants (45.1%) undertook the CTA tutorial in their third semester of clinical training, and 118 (54.9%) undertook the CTA tutorial in their fourth semester of clinical training.

### *Experiences performing pelvic examination*

At the time of their CTA tutorial, approximately half of all students had experience performing a pelvic examination on a clinical patient (49.3%). The median number of pelvic examinations performed was two (range 1 to 10 examinations). The majority of these examinations were performed on conscious patients, with 46 examinations (19.2%) performed on anaesthetised patients. Almost all students (89.7%) had practised pelvic examinations on a manikin. By the end of the medical course, almost all students (97%) had performed a pelvic examination on a clinical patient with a median of four pelvic examinations performed (range 1 to 20 examinations). The proportion of examinations performed on anesthetised patients remained constant at approximately 19.3% of all pelvic examinations undertaken.

### *Impact of the CTA tutorial*

Students provided ratings on five items that assessed their perceptions of the effectiveness of the CTA tutorial in enhancing their learning. Most students were extremely positive about the benefits of the learning experience. Almost all students agreed or strongly agreed that: the learning objectives of the session were clear (95.3%), the feedback from the CTAs was useful (95.8%), the supportive environment increased their learning (94.0%), participating in the tutorial enhanced their sensitivity towards women having pelvic examinations (89.8%) and that the tutorial provided a model for other patient interactions (90.7%).

### *Impact on ratings of confidence and attitudes towards pelvic examination*

Before participating in the CTA tutorial, few students expressed concerns about performing pelvic examinations due to cultural background, religious beliefs or because of embarrassment (Table 1). Far more students felt anxious about performing pelvic examinations and were worried that they may hurt the patient during the examination. Students also had relatively low confidence in their ability to perform a pelvic examination and to interpret the findings. The ratings reported in Table 1 use the untransformed rating scale. Prior to analysis, the negatively worded items were reverse coded so that for all items, higher scores reflected more positive responses.



ISSN 1442-1100

Table 1
*Mean Ratings (and Standard Deviations) for Confidence in and Attitudes towards Performing Pelvic Examinations (n = 215)*

| | Start of the CTA tutorial | End of the CTA tutorial | End of the medical course |
|---|---|---|---|
| | Mean *(SD)* | Mean *(SD)* | Mean *(SD)* |
| I am confident about performing pelvic examinations. | 2.4 *(0.87)* | 3.8 *(0.55)* | 3.2 *(0.96)* |
| I am confident in my ability to interpret the findings of a pelvic examination. | 2.2 *(0.77)* | 3.1 *(0.82)* | 2.8 *(1.02)* |
| Performing pelvic examinations could be difficult for me because of my cultural background. | 1.9 *(0.87)* | 1.7 *(0.78)* | 2.0 *(0.93)* |
| Performing pelvic examinations could be difficult for me because of my religious beliefs. | 1.6 *(0.69)* | 1.5 *(0.69)* | 1.7 *(0.77)* |
| I feel embarrassed about performing pelvic examinations. | 2.5 *(0.96)* | 2.1 *(0.80)* | 2.4 *(0.90)* |
| I feel anxious about performing pelvic examinations. | 3.1 *(1.03)* | 2.5 *(0.92)* | 2.7 *(1.02)* |
| I worry that I may hurt the patient during a pelvic examination. | 3.6 *(0.96)* | 2.9 *(1.00)* | 3.0 *(1.04)* |

Note: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

By the end of the CTA tutorial, average ratings of confidence and attitudes towards pelvic examination had increased significantly. Pairwise comparisons indicated that students were more confident in their ability to perform a pelvic examination and interpret the findings, less anxious and embarrassed about performing a pelvic examination and less worried that they may hurt the patient during an examination (all $p < 0.001$). Although unexpected, average ratings of difficulty in performing pelvic examinations due to cultural background or religious beliefs also marginally improved.

Average ratings of confidence and attitudes towards pelvic examination decreased between the end of the CTA tutorial and the end of the medical course, $F(1, 209) = 47.96$, $p < 0.001$, $\eta_p^2 = 0.19$, but remained higher than students' ratings before the CTA tutorial, $F(1, 209) = 73.27$, $p < 0.001$, $\eta_p^2 = 0.26$. Pairwise comparisons indicated that at the end of the medical course, students remained more confident in their ability to perform a pelvic examination and interpret the findings, less anxious, and less worried that they may hurt the patient during an examination than they were before completing the CTA tutorial (all $p < 0.001$).

### *Impact on ratings of communication ability and technical skills*

We first aimed to assess the immediate impact of participating in the CTA tutorial on students' ratings of competence (communication ability and technical skills) in performing pelvic examinations. Our second aim was to assess whether competence ratings at the end of the CTA tutorial were similar to ratings at the end of the medical course. Table 2 shows the means and standard deviations of students' global ratings of



ISSN 1442-1100

communication ability and technical skills in performing pelvic examinations across the three time points. In the majority of cases, CTA ratings of students' technical and communication skills were the same as (39.2% communication, 37.0% technical) or were one rating category higher (40.7% communication, 36.5% technical) than students' ratings. These data suggest good concordance between student and CTA ratings, with students tending to underestimate rather than overestimate their skills in comparison with expert raters. Ratings of students and CTAs differed by two or more rating categories for 16 students (7.7%) for communication skills and for 28 students (13.5%) for technical skills. We conducted analyses excluding students whose self-ratings differed by two or more rating categories from the expert raters. The results of these analyses did not differ from analyses using the entire sample, so we report outcomes for the entire sample below.

Table 2
*Mean Ratings (and Standard Deviations) for Overall Skills in Performing Pelvic Examinations (n = 215)*

| Expertise in performing a pelvic exam | Start of the CTA tutorial<br>Mean *(SD)* | End of the CTA tutorial<br>Mean *(SD)* | End of the medical course<br>Mean *(SD)* |
|---|---|---|---|
| Communication ability | 2.8 *(0.82)* | 4.0 *(0.58)* | 3.9 *(0.64)* |
| Technical skills | 2.3 *(0.83)* | 3.6 *(0.67)* | 3.3 *(0.75)* |

Note: 1 = *Poor*, 2 = *Below average*, 3 = *Average*, 4 = *Good*, 5 = *Very good*

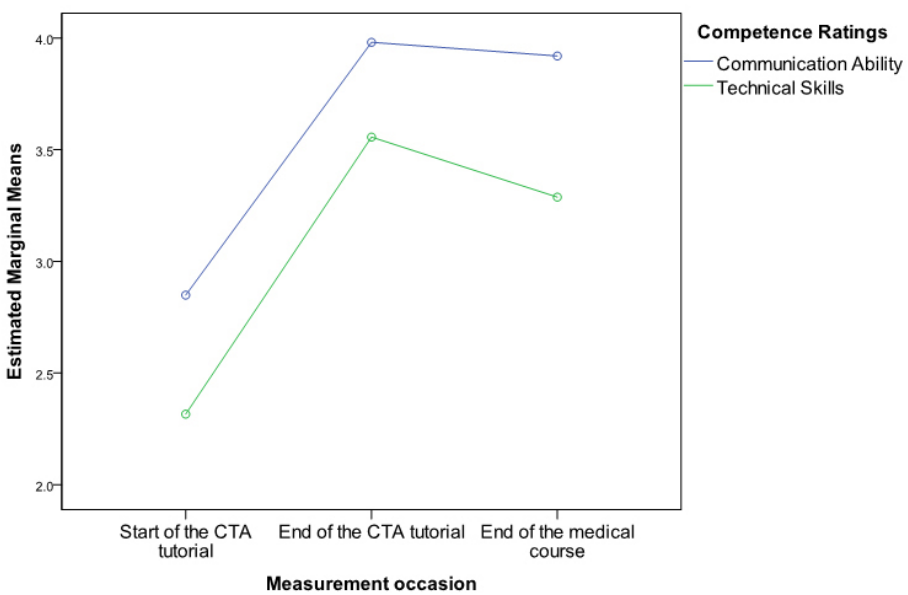


*Figure 1.* Student ratings of competence in performing pelvic examination from the start of the CTA tutorial to the end of the medical course.



ISSN 1442-1100

Students' ratings of confidence in communication ability were higher on average than ratings of technical skills, $F(2, 377) = 310.20$, $p < 0.001$, $\eta_p^2 = 0.60$, and average ratings increased significantly over time, $F(1, 211) = 250.46$, $p < 0.001$, $\eta_p^2 = 0.54$. However, there was also a significant interaction between skill ratings and time of rating, $F(2, 406) = 5.20$, $p = 0.007$, $\eta_p^2 = 0.02$. This interaction (illustrated in Figure 1) is explained by significant increases in average ratings for communication ability and technical skills from the beginning to the end of the CTA tutorial. From the end of the CTA tutorial to the end of course, communication ability ratings remained stable, but ratings of technical skill decreased. Students completed the final evaluation of their technical and communication skills 6–15 months after participating in the CTA tutorial; however, change in ratings between the end of the CTA tutorial and the end of the medical course did not depend on time elapsed since the tutorial, $F(1, 206) = 0.128$, $p = 0.721$.

Participants also self-rated specific aspects of their communication and technical skills in performing the pelvic examination. The mean ratings and standard deviations for key aspects of students' communication skills and technical skills in performing a pelvic examination at the end of the CTA tutorial and at the end of the medical course are shown in Tables 3 and 4.

Ratings of perceived competence in technical skills decreased over time, $F(1, 210) = 79.02$, $p < 0.001$, $\eta_p^2 = 0.2$. Examination of individual technical skills revealed that average ratings declined significantly for *correct removal of speculum*, *minimal movement of the hand or speculum, ability to assess pelvic organs (uterus, cervix, ovaries)* and *understanding the degree of pressure required to assess the uterus*. Ratings of perceived competence in individual communication skills improved over time, $F(1, 210) = 11.48$, $p < 0.001$, $\eta_p^2 = 0.27$; however, examination of individual skills revealed that average ratings increased significantly only for *using words that are neutral* and *providing clear instructions*.

Table 3
*Mean Ratings (and Standard Deviations) for Aspects of Communication Skills in Performing Pelvic Examinations*

| How would you rate your communication skills in these areas? | End of CTA tutorial Mean *(SD)* | End of the medical course Mean *(SD)* | Sig |
|---|---|---|---|
| Gaining informed consent | 4.0 *(0.59)* | 4.1 *(0.56)* | NS |
| Using words that are easily understood | 4.0 *(0.59)* | 4.1 *(0.53)* | NS |
| Using words that are neutral | 3.8 *(0.63)* | 4.0 *(0.63)* | $p < 0.05$ |
| Using appropriate eye contact | 4.0 *(0.65)* | 4.1 *(0.56)* | NS |
| Providing clear instructions | 4.0 *(0.57)* | 4.1 *(0.53)* | $p < 0.001$ |
| Demonstrating consideration of patient comfort | 4.1 *(0.63)* | 4.1 *(0.52)* | NS |
| Giving patient control of the examination | 4.0 *(0.63)* | 4.0 *(0.65)* | NS |

Note: 1 = *Poor*, 2 = *Below average*, 3 = *Average*, 4 = *Good*, 5 = *Very good*



ISSN 1442-1100

Table 4
*Mean Ratings (and Standard Deviations) for Aspects of Technical Skills in Performing Pelvic Examinations*

| How would you rate your technical skills in these areas? | End of the CTA tutorial Mean *(SD)* | End of the medical course Mean *(SD)* | Sig |
|---|---|---|---|
| Appropriate insertion of speculum/fingers (parting labia, asking patient to breathe in and out) | 3.7 *(0.69)* | 3.6 *(0.74)* | NS |
| Correct technique for reinsertion (remove, re-angle, reinsert) to visualise cervix | 3.5 *(0.68)* | 3.4 *(0.76)* | NS |
| Correct stabilising of speculum to take Pap smear | 3.6 *(0.72)* | 3.6 *(0.69)* | NS |
| Correct removal of speculum | 3.8 *(0.68)* | 3.6 *(0.68)* | $p < 0.001$ |
| Minimal movement of speculum/fingers | 3.6 *(0.73)* | 3.4 *(0.74)* | $p < 0.001$ |
| Ability to assess pelvic organs (uterus, cervix, ovaries) | 3.3 *(0.80)* | 3.0 *(0.83)* | $p < 0.001$ |
| Understanding the degree of pressure required to assess the uterus | 3.5 *(0.74)* | 3.1 *(0.87)* | $p < 0.001$ |

Note: 1 = *Poor*, 2 = *Below average*, 3 = *Average*, 4 = *Good*, 5 = *Very good*

## Discussion

The CTA tutorial was designed so medical students could learn the technical and communication skills appropriate to performing pelvic examinations from laywomen skilled in providing feedback to students on these skills. All students in our medical course participate in this program, which provides highly individualised attention, with two CTAs for every two students in the 3-hour tutorial. Our research demonstrates a clear immediate impact on both student attitudes towards performing pelvic examination and their perceived competence in their technical and communication skills. This finding supports research, such as that of Siwe et al. (2007) and Dilaveri et al. (2013) on the usefulness of professional patient programs, particularly those that utilise feedback to enhance medical students' learning of pelvic examination skills.

Professional patient programs are usually highly regarded by students (Carr & Carmody, 2004; Dilaveri et al., 2013; Jha et al., 2010; Plauche & Baugniet-Nebrija, 1985), and the current study affirmed these findings. In some instances, students performed a pelvic examination for the first time during the CTA tutorial; CTAs are trained to manage students' fear or anxiety about learning the examination. In the supportive context of the CTA tutorial, an immediate impact on student attitudes and skills is fully expected. This study extends previous research by considering whether the immediate post-training effects are evident long term. Both students' self-rated technical and communication skills remained higher at the end of the medical course than before undertaking the CTA tutorial. These effects were evident regardless of the time that had elapsed since students participated in the CTA tutorial.



ISSN 1442-1100

Self-rated communication did not decrease from the end of the CTA tutorial to the end of the medical course. In contrast, self-rated technical skills decreased during this period (while remaining higher than their pre-tutorial ratings). Students may perceive that communication is a generic skill that they are able to practise in a range of clinical encounters. This finding is interesting in that it implies that students may not regard the communication of patient and practitioner for pelvic examination taught in the CTA tutorial as specialised. An alternative explanation is that students believed that the training received in the context of the CTA tutorial was sufficient to develop and master the communication skills for pelvic examination. In contrast, a decline in overall ratings for technical skills may suggest that ongoing practice of the pelvic examination is required to maintain students' competence in performing the examination. In particular, ratings of technical competence at the end of the course suggested that students' skills deteriorate in some key aspects of the examination, such as understanding the degree of pressure required to assess the uterus. Students remained less anxious at the end of the medical course about performing a pelvic examination and less worried about hurting a patient than they were before the CTA tutorial. Similarly, their confidence in performing the examination and in interpreting the findings was higher than before the tutorial. Nonetheless, average ratings for these attitudes towards the examination remained low and declined from the end of the CTA tutorial to the end of the medical course.

After undertaking the CTA tutorial during their women's health rotation, students have few opportunities to practise pelvic examination during the remainder of the medical course. The CTA tutorial provides significant benefits for students' technical skills, which are apparent even at the end of the medical course. However, the decline in self-reported technical skills and in student confidence in performing the examination between the end of the CTA tutorial and the end of the medical course suggests that additional opportunities to consolidate these skills should be provided in the final stages of medical training.

### *Limitations and future research*

This research tracked one cohort of students who participated in the CTA tutorial and assessed their self-rated technical and communication skills in performing a pelvic examination at three points in time. The study design did not include a comparison group, as all students in the medical course undertake the CTA tutorial. Students experience a range of clinical activities between completing the CTA tutorial and the end of the medical course. The degree to which student ratings of technical and communication skills at the end of the medical course are due to participating in the CTA tutorial or other, unmeasured factors, is unclear. The study used students' self-ratings of technical and communication skills, which could give an inflated estimate of students' competence. Nonetheless, CTA ratings of student skills showed good concordance with student ratings, with students tending to rate their own performance more harshly than expert raters. There is, however, scope in future work to investigate different approaches to assessing competence in performing pelvic examination. Ratings from CTAs or other expert raters could be integrated into future long-term assessments of students' skills after undertaking the CTA tutorial to investigate concordance with student self-ratings.



ISSN 1442-1100

The findings of the current study also raise questions about the mechanisms underlying student learning in the CTA tutorial. Future research will explore the use of feedback in the CTA tutorial and investigate student and CTA perceptions of how feedback enhances or impedes student learning of pelvic examination.

## Conclusion

A short, targeted learning activity using a professional patient program and incorporating feedback generates immediate and long-term benefits to medical students' technical and communication skills in performing pelvic examination. A challenge for the future of programs of this kind is justifying their value in the context of the expense of individualised tuition. The findings of the current study suggest that the clear immediate benefits of the tutorial remain apparent at the end of the medical course, even when students have few additional opportunities to practise pelvic examinations. Training women from the community to teach medical students to perform pelvic examination provides a time-efficient approach to teaching and learning that has significant and durable effects on students' skills. The durability of these effects over time, when students have few further opportunities for practice, vindicates the program's resourcing.

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