

Teaching adjuvant endocrine breast cancer treatment to medical students

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ABSTRACT

Background: In undergraduate medical education, students are supposed to acquire knowledge and understanding about the basic principles of adjuvant breast cancer treatment. The best education method in this context is unknown. In this randomised study we assessed the effect of designing a patient education poster on knowledge, perceived participation and students' satisfaction compared with case-oriented education concerning endocrine therapy for breast cancer patients.

Methods: This study was conducted in the Bachelor Oncology Course for undergraduate students in Medical Science of the Radboud University Nijmegen Medical Centre. In the experimental group, students designed and created a patient education poster in small groups. In the control group, students answered case-based questions in small groups. Knowledge was tested at different moments using multiple-choice questions. To assess perceived participation and satisfaction, students filled out questionnaires.

Results: 329 students participated in the study. No difference in knowledge was observed between the experimental and control group. However, students in the control group reported a higher perceived participation and satisfaction compared with the students in the experimental group ($p < 0.05$).

Conclusion: In this study, working on case-based questions was preferred compared with designing a patient education poster in terms of students' perceived participation and satisfaction. Working on case-based questions may be appreciated by medical students as most relevant for their future profession. We advocate more attention

to the importance of patient education in the medical curriculum, to help students realise the relevance of this aspect of medical profession.

KEYWORDS

Breast neoplasms, competency-based education, medical oncology, undergraduate medical education

INTRODUCTION

Breast cancer is the most common life-threatening malignancy among women and the second most common cause of cancer death in women in the Western world.¹ Over the years, mortality has declined partly due to improved treatment modalities. One of these modalities is adjuvant endocrine therapy in hormone-sensitive breast cancer patients. In postmenopausal patients, adjuvant endocrine treatment with an upfront aromatase inhibitor (AI) or a switch therapy of tamoxifen and an AI is standard of care, while in premenopausal women adjuvant treatment with tamoxifen with or without ovarian suppression is recommended.¹ Due to the (rising) incidence of breast cancer a large proportion of medical professionals will be faced with breast cancer patients. Therefore, in the Medical Science Bachelor curriculum of the Radboud University Nijmegen Medical Centre (RUNMC), students are supposed to acquire knowledge and understanding about the basic principles of adjuvant breast cancer treatment, such as working mechanisms, (contra)indications and side effects. However, the question remains which instructional method is most effective?

Previous studies have indicated that cooperative learning is a very powerful method to process information.² Cooperative learning refers to all educational methods where students work together in groups in positive interdependence to accomplish shared learning goals. Working in small groups of 6-8 students improves the quality of discussions and the development of skills such as deep thinking and sharing of experiences.³ Moreover, working in small groups, students feel that they participate more actively.⁴ Active participation of students has shown to contribute to knowledge. Learning processes are stimulated by the fact that learners communicate and interact actively.⁵

To further enhance learning in small groups, it seems relevant that students can work on specific products such as posters, poster presentations, or concept maps.⁶ Working on concrete products stimulates interaction between students, increases their knowledge about the subject and their self-confidence.⁷

However, to the best of our knowledge no studies are available that investigate the influence of working in small groups on a concrete product in medical oncology education. In this study we will assess the effect of working on a concrete product in small groups, viz. the design of a patient education poster, with respect to knowledge, perceived participation and students' satisfaction in a Bachelor course versus conventional sessions. Designing a patient education poster was chosen as it is a concrete and sensible task that was expected to stimulate deep learning as it required students to actively incorporate knowledge in order to summarise and rephrase this knowledge into plain, understandable language. The design of a patient education poster as a teaching method was regarded specifically appropriate in the context of adjuvant endocrine treatment, as proper patient education may improve adherence to endocrine treatment and, therefore, treatment outcome.

MATERIALS AND METHODS

Setting

In the conventional Bachelor curriculum of the RUNMC education is structured in blocks and organised in themes. Students visit lectures, work together in small groups and do assignments in order to deepen the different topics. Afterwards, they have the opportunity to visit a dedicated response session, where they can ask questions about the topics of the course. And lastly, they make a final assessment to finish the course. The part of the oncology course that was the subject of the present study focussed on adjuvant hormonal treatment of breast cancer patients, teaching working mechanisms, side effects, indications and outcome of tamoxifen and aromatase inhibitors.

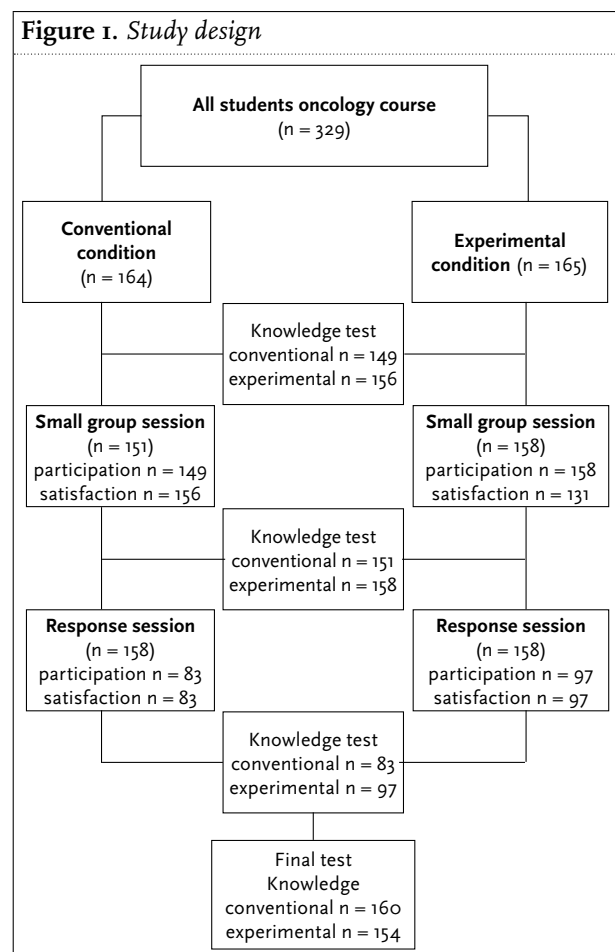
Respondents

A total of 329 undergraduate medical students (33.7% male, 66.3% female) of the RUNMC signed up for the mandatory second-year Bachelor Oncology Course in November and December 2010. During the first plenary lecture of the course, students were informed about the study. Students were randomised to attend either two conventional sessions on adjuvant endocrine treatment or two experimental sessions. The male-female ratio was equal in both groups. In both groups, the first session consisted of a mandatory small group session and the second session of a (non-mandatory) response session. Three hundred and nine students participated in the small group sessions and 180 of these students attended the response sessions (*figure 1*). The study was approved by the general coordinator of the course as well as the education management team of the RUNMC.

Procedure

In both the conventional and the experimental approach the first small group session lasted two hours, while the subsequent response session lasted one hour. During the first session in the conventional arm students were divided into small groups of five persons and, as a

Figure 1. Study design



group, had to answer questions based on patient cases concerning adjuvant endocrine breast cancer treatment with tamoxifen and the aromatase inhibitor letrozole. During the response session all the students assigned to the conventional arm had the opportunity to ask questions about the subject. In the experimental arm, in the first session the students designed a patient education poster on adjuvant endocrine treatment of breast cancer with either tamoxifen or letrozole in small groups of five students and prepared themselves to present the poster in the response session. During this response session students could read all the posters created by their colleagues. Two of the created posters per session – one on letrozole and one on tamoxifen – were selected to be presented. Afterwards, the posters were discussed and the students had the opportunity to ask questions.

To prepare for the sessions on endocrine treatment of breast cancer patients, all students were expected to read specific chapters in their textbook on adjuvant endocrine treatment and answer the accompanying questions.

The students participating in the study filled out questionnaires to assess knowledge, perceived participation and satisfaction (*figure 1*). Before the start of the course, the four medical oncologists who were teaching in the adjuvant endocrine treatment sessions were informed about the study and attended an oral presentation on the new teaching approach. They also received a written manual on the small learning groups and the corresponding response session. All teachers had several years of experience in both medical oncology and medical teaching. The teachers were allocated to teach in two conventional sessions and two experimental sessions.

Instruments

To assess knowledge, four tests with comparable items for knowledge testing were handed out: before the first session to assess prior knowledge, directly after the first and second session and in the final test of the whole oncology course (1.5 weeks later). To assess the effect of the new teaching approach on perceived participation and satisfaction, students filled out questionnaires just after the first and second session.

The tests to determine the students' knowledge were designed by a teacher in medical oncology. The course coordinator and an assessment expert were consulted. Each test consisted of six multiple-choice questions, which covered the predefined subjects of the small group learning (working mechanisms, (contra)indications and side effects of adjuvant endocrine treatment). Each of these questions gave a score of 1 point, the questions could be answered as correct or incorrect.

Based on a questionnaire by Kooloos *et al.*⁸ a 19-item questionnaire was constructed to assess perceived participation and student satisfaction. This questionnaire

was administered directly after the small group session to assess the perceived participation and satisfaction of the students about the small group session that they had just attended (Cronbach's alpha .89) and the response session, to assess the perceived participation and satisfaction of the students about the response group session that they just attended (Cronbach's alpha .94).

Statistics

For the statistical analyses, the statistical package for social sciences (SPSS) Windows version 18.0 was used. To determine knowledge, t-tests for repeated measures were performed. To assess differences between the experimental and control group variance analyses, one-way ANOVAs were conducted using the difference scores of the knowledge tests; $p < 0.05$ was considered statistically significant.

To assess differences between the average scores for student satisfaction and perceived participation in the two teaching methods, one-way ANOVA analyses of variance were conducted. If differences between the teaching methods were observed, an independent t-test was performed to further assess those differences.

Post-hoc analyses were conducted to compare knowledge, perceived participation and student's satisfaction, attendance at the non-compulsory response session, and students' self-reported preparation for the sessions. Also, we compared the group of students who studied tamoxifen with the group of students who worked on letrozole.

RESULTS

Knowledge

In both the experimental and the control group knowledge significantly increased from the pretest to the final test. The highest scores were attained at the second post-test, directly after the response session. No difference was observed in knowledge between the experimental and the control group (*table 1*).

Post-hoc analyses showed that students who had attended the response session had higher scores on the final test than students who did not attend this session ($p < 0.001$). No differences were observed on the pretest between the students who prepared for the sessions compared with those who did not read the textbook and answer the accompanying questions ($p = 0.182$). However, the students who reported to have prepared themselves scored higher on the post-test directly after the response session ($p = 0.039$) as well as on the final test ($p = 0.001$).

The students who worked on the posters on tamoxifen showed higher scores on the post-test after the small group session and response session compared with the students who prepared for letrozole. On the final test, no differences were observed between the groups.

Table 1. Average proportion of correctly answered questions on the four tests

	Experimental group			Control group		
	N	Av.	SD	N	Av.	SD
Pretest first session	156	.67	.20	149	.69	.20
Post-test first session	158	.79	.15	151	.77	.18
Post-test second session	97	.89	.13	83	.89	.14
Final test	154	.72	.16	160	.71	.18

Perceived participation

The students in the conventional arm (working on the questions based on a case) reported a higher perceived participation during the small group session compared with the students in the experimental arm (working on the patient education poster) ($p=0.037$) (table 2). No differences in perceived participation were observed between the students who had prepared themselves compared with the students who had not prepared themselves for the sessions. Perceived participation was not significantly different between the tamoxifen and letrozole subgroups.

Students' satisfaction

The students in the conventional groups working on the cases showed higher satisfaction about the two educational sessions compared with the students in the experimental group, who worked on a poster (table 3). No differences in satisfaction were observed between the students who had

prepared themselves compared with the students who had not prepared themselves for the sessions. Students' satisfaction was not significantly different between the tamoxifen and letrozole subgroups.

DISCUSSION

In this study, we observed that the acquired knowledge on adjuvant endocrine breast cancer treatment proved to be similar for students working on an education poster (experimental group) and students answering questions based on a case (control group), while student satisfaction was lower in the experimental group working on posters. Perceived participation was lower in the experimental group for the small group session, although no differences in perceived participation in the response session were observed between the conventional and the experimental group. Although our study focused on educational sessions in an oncology course, the results may be of direct relevance for other medical courses as our prestudy hypothesis – working together in small groups on a specific product increases learning satisfaction, perceived participation, and knowledge – would in principle be applicable to a broad range of medical topics.^{3,5} However, despite our expectations, this hypothesis was not confirmed in our study.

Two major reasons can be identified that could explain the discrepancy between the results of the study and our pre-study hypothesis. First of all, for these medical students, creating a patient education poster may have been new for them and they may have felt uncomfortable about it. More specifically, working on a case may have been regarded by the students as more relevant for their future profession than creating a patient education poster. Applying their medical knowledge to solve clinical problems may have seemed more 'medical doctor-like' than patient education. Interestingly, however, according to the CanMeds roles, patient education is one of the main competences of a health care professional.⁸ CanMeds is an educational framework identifying and describing seven roles of health care professionals that would lead to optimal health care delivery and outcomes. This framework of core competencies includes the different roles that physicians fulfil in their daily practice, namely the roles of Medical Expert, Communicator, Collaborator, Health Advocate, Manager, Scholar and Professional. In the context of endocrine breast cancer treatment, patient education is indeed a very relevant competence, as the benefits of endocrine treatment in terms of disease recurrence and survival require long-term adherence to the medication regimen. Previous studies indicate that 5-32% of the patients discontinue endocrine treatment or skip or lower their doses in the course of time.^{9,11-14} Proper patient education may improve adherence and, therefore, treatment outcome.

Table 2. Average score for perceived participation in the first and second session

	N	Av.	SD	df	F	p
First session, experimental group	158	14.84	2.33	307	4.41	.037*
First session, control group	151	15.34*	1.83			
Second session, experimental group	97	8.95	1.93	178	1.46	.228
Second session, control group	83	9.25	1.34			

* $p<0.05$.

Table 3. Average score for satisfaction in the first and second session

	N	Av.	SD	df	F	p
First session, experimental group	131	36.90	8.27	260	62.40	.000*
First session, control group	131	46.66*	7.60			
Second session, experimental group	97	41.02	11.40	178	15.18	.000*
Second session, control group	83	47.33*	10.11			

* $p<0.05$.

Currently, the CanMed framework forms the basis for objectives of medical training and provides the standard for continuing professional development. However, students in the current course may not have been familiar with these CanMed roles. In fact, patient education was not explicitly mentioned as a formal learning objective of the course.

A second reason that could explain the discrepancy between the results of the study and our pre-study hypothesis concerns the role of assessment driven learning. Assessment driven learning implies that students prepare mainly for the assessment they have to do.¹⁰ Student's perceptions about the way they will be assessed determine their choices for and emphasis on specific learning strategies in learning activities.

In our study, students were preparing mainly for multiple-choice questions directly covering the (knowledge-based) subjects of the course. Although having to think about the presentation of the poster and rewording medical terminology in plain language could have stimulated deep learning,³ in practice, students may have felt that creating a poster distracted them from their primary learning task. The purpose of the education poster, related to the knowledge-based assessment, may not have been clear to them. Therefore, our results could not only be explained by the perceived relevance of the learning task for the students' profession in the far future, but also by the relevance for the assessment of the course in the near future.

Of note, students who attended the non-obligatory response session had higher scores on the final test than students who did not attend these sessions. Also, students who prepared themselves by making the self-assignment had higher scores on the post-test directly after the second session. These results may not only be explained by more exposure to the content of the course, but also by a higher intrinsic motivation of the students. The students attending the response session and the students who made the self-assignment may have been more motivated than the students who did not attend the response sessions or made the self-assignment. Unfortunately, motivation was not tested in this study and may be relevant to incorporate in future studies on the effect of new educational approaches.

In conclusion, according to the results of our study, to teach medical students the principles of adjuvant endocrine treatment of breast cancer patients, working on case-based questions must be preferred compared with creating a patient education poster in terms of student's participation and satisfaction. This may be applicable to other medical topics, too. By working on case-based questions, students recognise the importance for their future profession more

easily and they feel comfortable with this way of learning. However, as patient education will be an important part of their future profession, we advocate that this perspective should be introduced more explicitly as a learning objective in the educational as well as in the assessment programme.

Disclosures

Data from this manuscript were presented at the Netherlands Association of Medical Education Congress in Egmond aan Zee, the Netherlands, on 18 November 2011.

Acknowledgements

Jan Willem Leer was general coordinator of the oncology course and facilitated the logistics of the study. Sander Alken, Sascha van Kuppeveld and Shifra Plooij were participating investigators.

Funding sources: no funding sources.

Conflict of interest statement: none declared.

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