Improvement of Knowledge and Practical Skills in Venipuncture through Web-Based Training

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Abstract. This paper reports on the implementation of web-based training in venipuncture as standardizable knowledge transfer. For this purpose, we performed an experimental study with nursing students and medical students.

Keywords. e-learning, web-based training, venipuncture, skillstest, ilias, nurse, medical students

1. Introduction

Taking blood samples is a daily routine in hospitals and in private practices. Complications are rare, but with the mass of procedures not insignificant. Nonetheless, the requirements for the proper procedure of a venipuncture are often not or only partially met. In Germany, taking blood samples belongs to the physicians’ delegable procedures [1] and can be carried out by other caring professionals after an instruction has taken place. For this purpose, we performed an experimental study with fifth year medical students and nursing students who improved their skills and knowledge by a web-based training (WBT) or a conventional teacher-led lesson.

2. Material and Methods

For the experimental study we tested a class of nursing students (n=23) regarding to their previous knowledge by a self-assessment questionnaire and a forced-choice test (test 1) with 10 test items on venous blood collection. Thereafter, the study participants were divided up into two randomized groups (group A: n=11; group B: n=12). Group B completed a conventional teacher-led lesson based on a script, while group A used the self-produced WBT at the same time. The contents of the conventional teaching and the WBT were identical. After completing the WBT, group A filled in an evaluation concerning the usability of the WBT. Then both groups completed test 1 again, as well as another 7 test items containing a forced-choice test (test 2). Finally the nursing students and the medical students (n=14) took blood samples from a test patient (skills
While they were subjected to a structured observation. The assessment was based on a checklist with a maximum score of 83.

3. Results

For organizational reasons there was a different class time for the two groups. Group B had 135 minutes while group A had a maximal teaching time of 95 minutes (29.63% less). These students (group A) used 79 minutes on average and 51 minutes on minimum. The evaluation of the students’ self-assessment for venipuncture technique showed that 73.91% of the students assessed themselves as rather good, rather poor or poor, while 17.39% assessed themselves as very good or good and 8.70% as very poor. In test 1 we measured an increase of correctly answered questions (group A 44.44% before, 70.00% after lessons; group B 38.00% before, 73.00% after lessons). In test 2 (after lessons) group A correctly answered 95.24% and group B correctly answered 70.00% of the questions. All study participants in group A evaluated the WBT positively, 77.78% even with very good or good. According to the analysis of the skills test, the nursing students in group A achieved a score of 68 on median, group B achieved a score of 59 on median by taking the blood samples. The medical students achieved a score of 53.5 on median by taking the blood samples without a training a short time before. The time for the procedure of a venipuncture took 331 seconds on median in group B and 363 seconds on median in group A. The medical students required 210 seconds on median for taking the blood samples.

4. Discussion

The study shows that knowledge gained by using the WBT qualifies the learners equally well or better for solving tasks than conventional lessons with demonstrations by a teacher do. With 25% more correctly performed tasks in final test 2, a greater increase in knowledge is measured for the WBT group. Another advantage of the WBT is 30% less teaching time compared to the conventional teaching. The study participants who performed the WBT (group A) provide a better quality in practical skills than the participants in group B and the medical students. However, nor the training of the nurse students by the lesson or the WBT can achieve the rapid performing of a fifth year medical student. Therefore the nursing students would need more opportunities for practical training.

With the WBT in venipuncture a more efficient tool for knowledge transfer in the field of taking blood samples has been developed. Because of the advantage of group A in competence regarding practical skills compared to group B, it can be assumed that the use of this WBT increases the quality of taking blood samples and disburdens the existing structures of necessary instructions. The prospective field of application could be the training and examination of medical students, nursing staff or phlebotomist in the German healthcare system.

References