Global Journal of Medical research: D
Radiology, Diagnostic Imaging and Instrumentation
Volume 14 Issue 1 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Educational Program for Radiography Students at Head CT

By Heggen KL, Johansen E, Silkoset RD & Karikari PD

Oslo University Hospital, Ullevål, Norway

Abstract- Introduction: An educational program was designed to improve relevant competence in brain anatomy, pathology, CT technique and physics among radiography students training at the section of neuroradiography, Oslo University Hospital, Ullevål.

Method and Materials: The educational program consisted of lectures, a compendium, hands-on lessons and competence testing. The lectures and compendium focused on brain anatomy, pathology, CT technique and physics. All second year radiography students at the University College in Oslo completed the same competence tests before and after their hospital training. This allowed a comparison of the competence improvement among students who followed the educational program, with those who did their training elsewhere (the control group).

The second year class comprised of 40 students. 29 took the initial test. Out of this number 12 participated in the program while the remaining 17, defined above as the control group, did not.

A total of 30 students however took the final test. 3 students who actually took part in the program opted out of the final test, reducing the number to 9 while the number of students in the control group was increased to 21 because 4 students who did not take the initial test joined the control group at the final test.

GJMR-D Classification : NLMC Code: WG 500

EDUCATIONALPROGRAMFORRADIOGRAPHYSTUDENTSATHEADCT

Strictly as per the compliance and regulations of:

Educational Program for Radiography Students at Head CT

Heggen KL [α], Johansen E [σ], Silkoset RD [ρ] & Karikari PD [ω]

Abstract- Introduction: An educational program was designed to improve relevant competence in brain anatomy, pathology, CT technique and physics among radiography students training at the section of neuroradiography, Oslo University Hospital, Ullevål.

Method and Materials: The educational program consisted of lectures, a compendium, hands-on lessons and competence testing. The lectures and compendium focused on brain anatomy, pathology, CT technique and physics. All second year radiography students at the University College in Oslo completed the same competence tests before and after their hospital training. This allowed a comparison of the competence improvement among students who followed the educational program, with those who did their training elsewhere (the control group).

The second year class comprised of 40 students. 29 took the initial test. Out of this number 12 participated in the program while the remaining 17, defined above as the control group, did not.

A total of 30 students however took the final test. 3 students who actually took part in the program opted out of the final test, reducing the number to 9 while the number of students in the control group was increased to 21 because 4 students who did not take the initial test joined the control group at the final test.

Results: Radiography students who participated in the educational program improved their test score from 31% to 61%, while the control group improved their score from 33% to 34%.

Conclusion: This study demonstrates a pronounced improvement in level of competence among students who followed the educational program.

I. Introduction

Head CT is a routine examination performed in all radiological facilities, the most frequently performed CT examination in Norway and the preferred examination in investigating acute head injury. The examination does not take more than a couple of minutes to perform. It is important that the radiographers know the normal anatomy of the brain and some pathology so they can react quickly if the scans show pathology that needs immediate treatment. It is not the radiographers' job to diagnose the patient. A fair knowledge of relevant pathology makes for easier and early communication between radiographer and radiologist for the initiation of treatment. Consequently, regular updating of knowledge provides a safer and smoother quality of examinations.

At the section of neuroradiography, Oslo University Hospital, Ullevål, we had seen a lack of competence in brain anatomy, pathology, CT technique and physics among the radiography students training at our section. We made similar observation among the new employees as well. We wanted to give the radiography students a better understanding of how the brain works and how it is affected by injury, and also focus on the importance of the head CT examination. It was also our aim to improve relevant competence in CT technique and physics among the radiographers working at the section of neuroradiography.

II. Method and Materials

In the autumn of 2009 we applied for financial support from a collaborative educational fund initiated by Oslo University Hospital and Oslo University College to start working on a project which would involve students pursuing radiography education at Oslo University College. The application was approved and a project team was put together. The team consisted of the manager of the section of neuroradiography, one representative from the Department of Radiography at Oslo University College and the senior technologist at the neuro CT.

We prepared a compendium that focused on normal anatomy of the brain, pathology, CT technique and physics. Contents of the compendium included among other things an example of a head CT scan protocol where all the relevant specialized CT related terminologies were explained. The compendium has a total of 71 pages of text, illustrations, figures and CT images. Topics in the compendium were selected based on our experience of what areas students and newly employed radiographers needed to improve their knowledge on.

We created 18 anonymous cases at the CT workstation and designed hands-on lessons for the students to work with. The tasks were made together with the representative from the radiography education at Oslo University College. The students were encouraged to make new series in different directions

Authors α σ: Oslo University Hospital, Ullevål, Section of neuroradiography.
Author ρ: Oslo University College.
Author ω: Oslo University Hospital, Ullevål, Section of neuroradiology.
e-mail: k_livelten@hotmail.com

with different slice thicknesses to help them recognize normal anatomy, and find projections to visualize possible pathology in the images. The objective was not only to make the students familiar with the different scanning techniques, but also to satisfy learning objectives set by the curriculum of the Department of Radiography at Oslo University College.

We made lectures using PowerPoint presentations on anatomy/pathology on one hand, and CT technique/physics on the other. Pre-training and post-training tests were designed to help us compare competence improvement of the students before and after the program.

The lectures were held by the senior technologist for the two students training at the neuro CT each particular week. The lectures were divided into anatomy and pathology for the first day of the week and CT technique and physics for the second day.

The tests consisted of 33 tasks, some multiple choice questions and figures which required students to name anatomical structures. In other tasks students were encouraged to provide answers with their own text. Maximum obtainable score at the test was 71 points. 16 of the tasks had relevance to topics in anatomy and pathology, while the remaining 17 related to CT technique and physics.

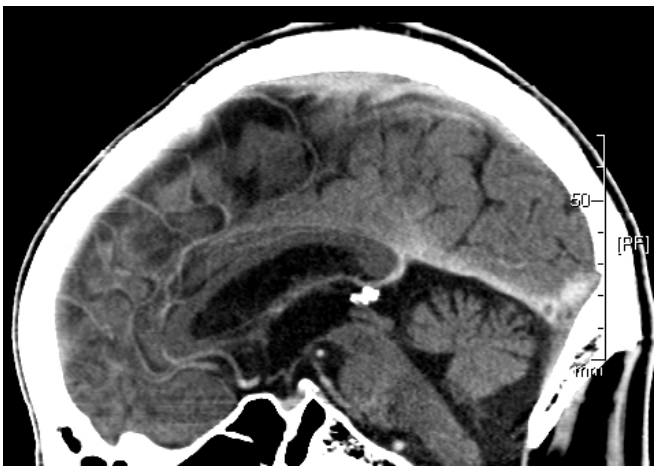
For purposes of quality assurance the program was tested with the radiographers at the section of neuroradiography at Oslo Univeristy Hospital, Ullevål, before the involvement of the recruited students. The section consisted of 14 radiographers, four of them worked exclusively with MRI or intervention. Participation in the test was voluntarly and results were made anonymous. We had 45 minutes long lecture each day; the first day's topics were anatomy and pathology based while the second day's lecture covered CT technique and physics.

Copies of the compendium were made available in all of our 5 laboratories. Because our section of neuroradiography is usually very buisy and time that is available for viewing cases at the workstation rather limited, radiographers were encouraged to put more emphasis on familiaraizing themselves with the content of the compendium whenever they had any free time. Both the tests were held during the department's regular educational time. The post-training test was held 4 weeks after the pre-training test. This allowed the radiographers ample time to read the compendium between the two tests. At the end of the program the results of the two tests were not completely comparable because some radiographers took either the first or the second test, while others took both. Evaluation of the program after the last test was held resulted in a marginal increase of the maximum available score to 72 points.

Oslo University College offers a three year bachelor's program for radiographers. We selected the second year students as our group of interest. The reason for this was that they were due to start a six - week internship in different hospitals as part of the CT module of the college. The educational program was added as a mandatory part of the internship period for the 12 students at Oslo University Hospital, Ullevål. To make it possible for all these students to get involved in the program, two students, instead of the usual one, were attached to the neuro CT each week.

For the students the pre-, and post-training tests were held at Oslo University College before and after the internship. The tests were mandatory for students who had their internship at our section, while those who had their internship elsewhere could opt to take the tests or not. Students who did not have their internship at our section were designated the control group. For ease of separation from the control group and to facilitate judgement of competence improvement, the test sheets of the students who had their internship at our section were marked with the letters "NR."

Figure 1 : Example of a task from the test: " Name the different parts of the ventricular system (arrows)"



On the first day of the project week the students had lessons in anatomy and pathology, received their own compendium and the tasks for the cases at the workstation. The program involved separating the day in two halves; while one student sat half of the day at the workstation, the other student got involved in the normal routine at the CT laboratory. Then they swiched at lunchtime. Students were offered direct help in the use of relevant applications at the workstation on the first day, while the second day was reserved for lessons in CT techniqe and physics. At the end of each week a supervisory radiographer showed the students the correct answers to the tasks at the workstation.

III. Results

The second year class comprised of 40 students. 29 took the initial test. Out of this number 12

participated in the program while the remaining 17, defined above as the control group, did not.

A total of 30 students however took the final test. 3 of the 12 students who actually took part in the program opted out of the final test, reducing the number to 9. The number of students in the control group increased to 21 because 4 students who did not take the initial test joined the group at the final test.

Test before internship
Students in the program (NR): 31% correct
Control group (CG): 33% correct

Test after internship
Students in the program (NR): 61 % correct
Control group (CG): 34% correct

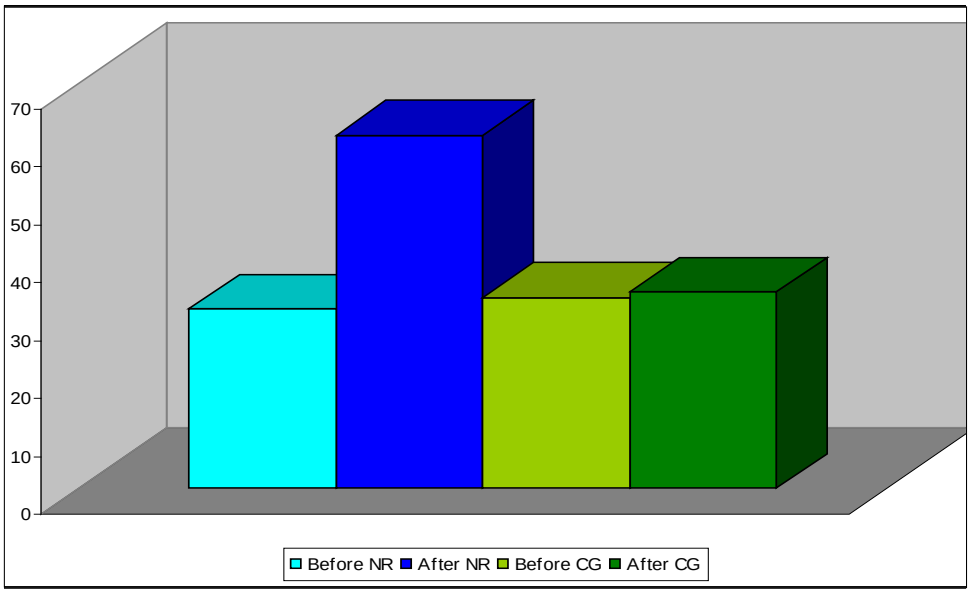


Diagram 1 : Overall results radiography students

The results separated by topics (anatomy, pathology, CT technique and physics):

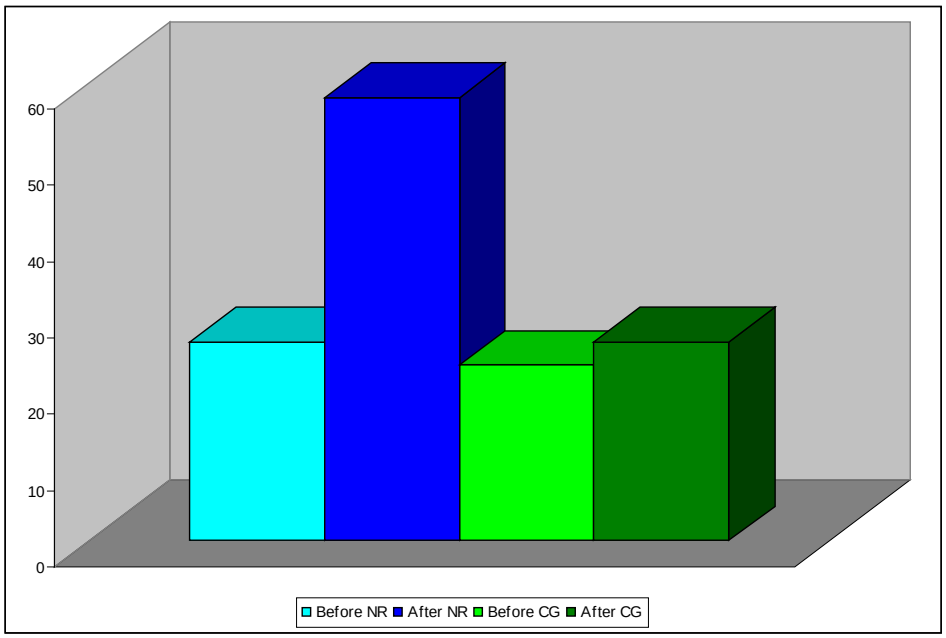


Diagram 2 : Testresults anatomy

Before NR	26 % correct
After NR	58 % correct
Before CG	23 % correct
After CG	26 % correct

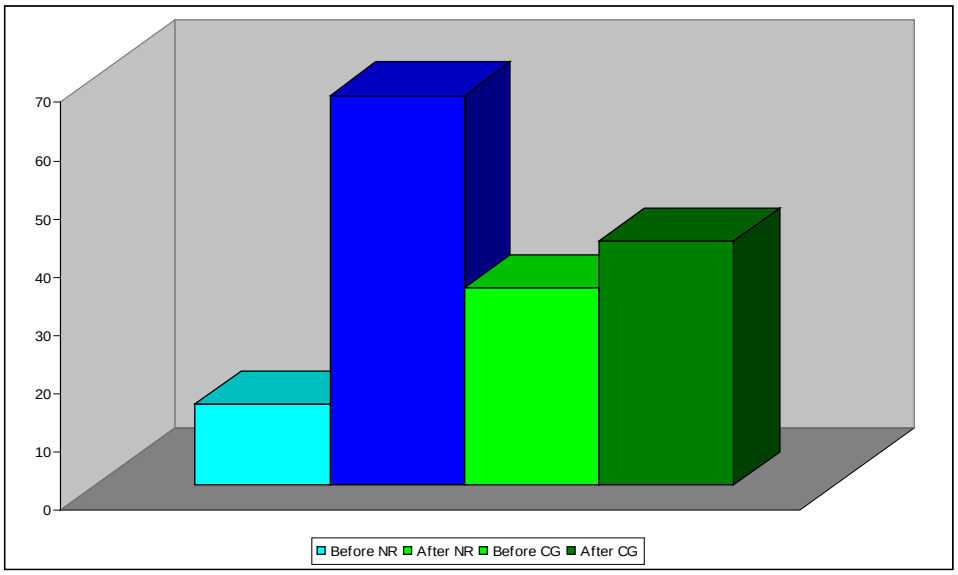


Diagram 3 : Testresults pathology

Before NR	14 % correct
After NR	67 % correct
Before CG	34 % correct
After CG	42 % correct

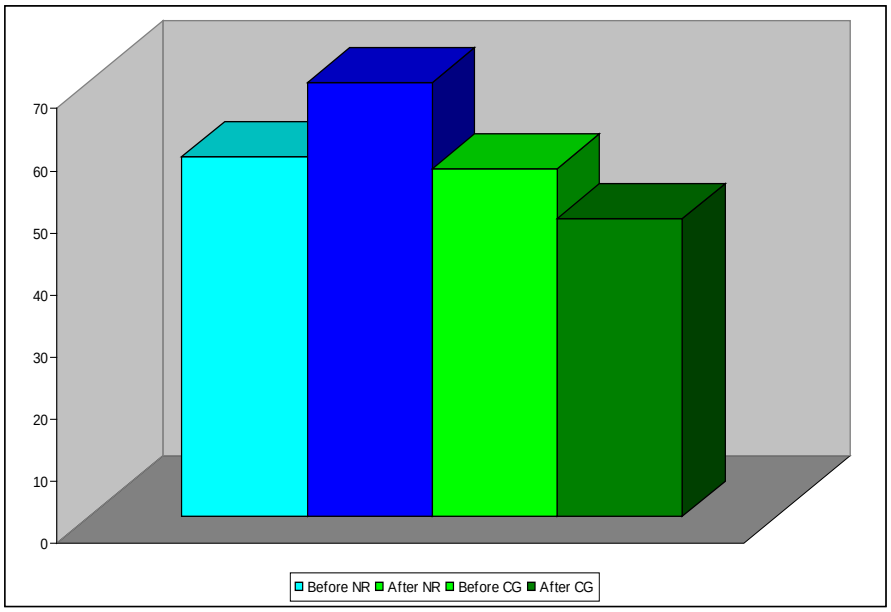


Diagram 4 : Testresults CT technique

Before NR	58 % correct
After NR	70 % correct
Before CG	56 % correct
After CG	48 % correct

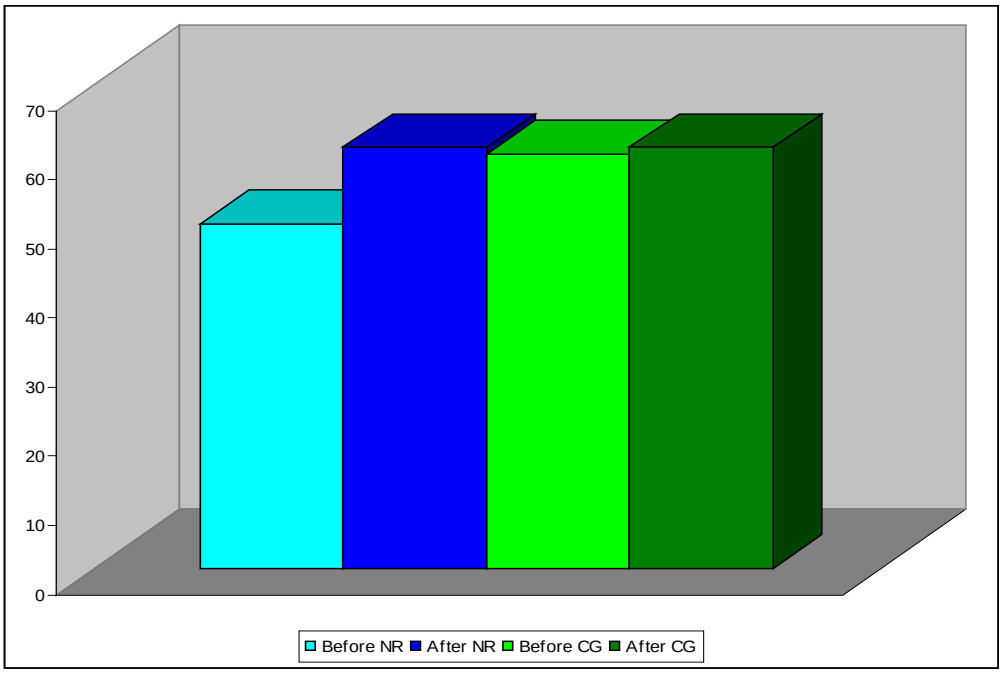


Diagram 5 : Testresults CT physics

Before NR	50 % correct
After NR	61 % correct
Before CG	60 % correct
After CG	61 % correct

IV. Discussion

The selection of the students who had their internship at Ullevål and participating in the program was randomized and made by the professional development manager at the Department of Radiology and Nuclear Medicine at Ullevål.

The Department of Radiography at Oslo University College was responsible for conducting the tests for the students before and after the internship. The first test was printed in color by a printing facility on campus. Unfortunately, because of printing difficulties, some students only received black and white copies while they sat for the second test. It turned out that the black and white printouts were of such poor quality that many of the students could not tell apart structures which had arrows pointed at them (ref. Figure1). This necessitated the printing of new (second) test sheets, all in color. Consequently all the students had to retake the second test.

In this respect, one can question whether the fact that the students had to take the second test twice had a negative impact on their motivation to do so, but the test results showed such significant improvement in competence that any possible effect of retaking the test could be discounted.

The section of neuroradiography was before the reorganization of Oslo University Hospital, Ullevål, a section specializing in neuro imaging . Students who had their internship here were therefore likely to see more CT examinations of the head than students who had their internship elsewhere. The section of neuroradiography had a GE (General Electric) LightSpeed XTE CT scanner, therefore it was costumary to use CT terminology adapted from this scanner. Students who had their internship in other hospitals and worked with CT scanners from other manufactures would be expected to be used to a different set of terminology from what is used in our section. This could be a possible handicap in answering questions regarding CT technique founded on GE's terminology in the test .

It merits repeating that students who had their internship with us were expected to have an inordinately more exposure to neurofocused imaging. This would turn out to be a contributing factor as to why the "NR" students scored so much better after the internship.

The anatomy and pathology based tasks were presumed to be easier to handle since they comprised of figures and CT images where students were expected to name anatomical structures and pathology. Tasks in relation to CT technique and physics, however, were presented as multiple choice questions.

The test results confirmed the above presumption as students scored highest on the anatomy and pathology tests. Another contributing factor was that greater emphasis was placed on anatomy and pathology in the compendium.

The students in the control group also showed some competence improvement in the same topics after the internship, which may indicate that they, too, had used the internship to improve their knowledge of brain anatomy and pathology.

The students' test results within CT technique and physics showed that the students had a fair grasp of these topics before the internship. Students who participated in the program (NR) significantly raised their competence, judged by their scores of the final test, while the control group (CG) scored lower on the same test.

The PowerPoint lectures were held at the section of neuroradiography by the senior technologist at the neuro CT each week for the two interns that paricular week. The teaching session involved an open dialogue among the senior technologist and the interns, which paved the way for the interns to directly access the teacher with questions along the way.

Much of the work leading up to the start of the program went into writing the compendium. The compendium consists of 71 pages, where 54 pages were allocated to anatomy and pathology. The remaining 17 pages covered CT technique and physics.

In the aftermath students has communicated positive feedback especially with respect to the formulation of tasks in the program, the contents of the compendium and the direct access they had to ask relevant questions throughout their stay. The above factors were viewed as particularly motivating in the run-up to the final test.

V. Conclusion

This study shows a significant improvement in level of competence among the students who had their internship at the section of neuroradiography, Oslo University Hospital Ullevål and participated in the educational program, compared to those students who had their internship elsewhere.