Efficiency of a minicourse in radiation reducing techniques: a pilot initiative to encourage less irradiating cardiological interventional techniques (ELICIT)

E Kuon, K Empen, D M Robinson, A Pfahlberg, O Gefeller, J B Dahm

METHODS

Before and after the minicourse we analysed the following mean radiation parameters of 10 coronary angiographies, performed by each of the seven participating interventionists at the cardiac centre of Greifswald University, Germany: total DAP, radiographic (DAPR) and fluoroscopic (DAPF) fractions of DAP, the number of radiographic frames and runs, and fluoroscopy time. Bypass graft controls, significant valve diseases, emergency catheterisations, and PCI were excluded, since they are inhomogeneous.

We based our oral in-house PowerPoint minicourse in interventional techniques with a focus image detector distance of 1.2 m, a 25 mm thick aluminium absorber, and a 20 cm flat panel detector field format, detector entrance dose rates amounted to 0.029 μGy/pulse (15 pulses/s) for fluoroscopy and to 0.170 μGy/frame for radiographic documentation (15 frames/s). DAP was measured by a light transparent ionisation chamber (K1-S Axiom; PTW, Freiburg, Germany).

We based statistical comparison of radiation dose parameters before and after the minicourse on analysis of variance and covariance models (checked by the Shapiro-Wilk test), which adjusted any mean values for the effect of the interventionist, as well as age, sex, and body mass index of the study patients.

RESULTS

Patients' mean (SD) overall DAP of all seven interventionists decreased from 30.8 (9.8) to 19.2 (6.8) Gy × cm² (p < 0.001) due to a reduction in radiographic DAPR from 21.0 (6.6) to 11.7 (3.2) Gy × cm² (p < 0.001). This was a result of slightly shorter radiographic runs but mainly of the efficient application of radiation reducing tube angulations and a significantly better collimation to the region of interest. DAPF/frame decreased from 29.2 (6.9) to 18.4 (4.5) mGy × cm² (p < 0.001) and DAPF/s decreased from 42.5 (11.7) to 26.4 (8.3) mGy × cm² (p < 0.001). However, the latter attempts took time: fluoroscopy time increased slightly from 245 (82) seconds to 266 (101) seconds, so that the reduction of DAPF missed significance.

For individual interventionists, the reduction of mean total DAPR and DAPF was apparently less influenced by the number of radiographic frames and the fluoroscopy time than by the DAPR/frame and the DAPF/s. Total DAP seems not to depend on the operator’s interventional experience (fig 1).

DISCUSSION

The presented minicourse in radiation reducing techniques, the first validated course to date, promises considerably less patient radiation exposure and consequently occupational operator dose due to coronary angiography in clinical routine. That dose reduction predominantly resulted from consistent collimation to the region of interest during both radiography and fluoroscopy.

In this pilot study, mean DAP before and after the minicourse did not correlate with fluoroscopy time, which increased slightly. Moreover, the fact that DAPF significantly exceeded DAPR raises questions about the widely accepted predominant significance of fluoroscopy time for total patient DAP and the operator’s efforts in reducing radiation. If DAPR and DAPF are recorded separately, the ratios of DAPR/frame to DAPF/s depends on the flat panel detector angle.

Abbreviations: DAP, dose–area product; DAPR, dose–area product fluoroscopic fraction; DAPF, dose–area product radiographic fraction; PCI, percutaneous coronary intervention

FROM BMJ JOURNALS

Cost effectiveness of nurse led secondary prevention clinics for coronary heart disease in primary care: follow up of a randomised controlled trial

James P Raftery, Guiqing L Yao, Peter Murchie, Neil C Campbell, Lewis D Ritchie

Objective: To establish the cost effectiveness of nurse led secondary prevention clinics for coronary heart disease based on four years’ follow up of a randomised controlled trial.

Design: Cost effectiveness analysis.

Setting: 19 general practices in north east Scotland.

Participants: 1343 patients (673 in intervention group and 670 in control group, as originally randomised) aged under 80 years with a diagnosis of coronary heart disease but without terminal illness or dementia and not housebound.

Intervention: Nurse led clinics to promote medical and lifestyle components of secondary prevention.

Main outcome measures: Costs of clinics; overall costs to health service; and cost per life year and per quality adjusted life year (QALY) gained, expressed as incremental gain in intervention group compared with control group.

Results: The cost of the intervention (clinics and drugs) was £136 ($254; €195) per patient higher (1998-9 prices) in the intervention group, but the difference in other NHS costs, although lower for the intervention group, was not statistically significant. Overall, 28 fewer deaths occurred in the intervention group leading to a gain in mean life years per patient of 0.110 and of 0.124 QALYs. The incremental cost per life year saved was £1236 and that per QALY was £1097.

Conclusion: Nurse led clinics for the secondary prevention of coronary heart disease in primary care seem to be cost effective compared with most interventions in health care, with the main gains in life years saved.

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