Reviewer’s report

Title: Thyroid Shields and Neck Exposures in Cephalometric Radiography.

Version: 1 Date: 8 May 2006

Reviewer: Keith Horner

Reviewer’s report:

General
This manuscript reports a survey of cephalometric radiographs. The first element of the research looks at the frequency of use of lead thyroid shielding. In the second element, the images were analyzed according to the amount of neck imaged in the examination. This was inferred by measurement of vertical distances from landmarks on the mandible and hyoid and by identifying the most caudal vertebral body shown on the image.

This work has a number of weaknesses. First, as acknowledged by the authors, it is limited in its value by reflecting practice in a single educational dental institution. The results for frequency of use of thyroid shields are, therefore not of great interest to those outside this institution. Second, the “neck height” above the edge of the lead (when present) is only a reflection of probable health risk. Thyroid position, and that of other relevant organs in the field, is not considered directly because they, of course, cannot be seen on the cephalograms.

By using a retrospective study, the authors had to “best guess” whether they were looking at a thyroid shield or full lead apron.

I suppose the value of the study, at best, is that it might be answering the question, “how much coverage of the neck does lead protection truly give in practice?” That would be OK, as I could be persuaded that hanging a lead apron around necks of patients would be much the same everywhere and the results could be generalised to other institutions. Instead, the message seems to get lost. What are the implications of this study? To me, despite the long discussion, the authors fail to get to the meat of the problem.

Assuming that thyroid shielding is of any value, the authors should discuss how to improve neck coverage, perhaps by design of the shields. A far more important issue is whether use of shielding should be our great concern. The key radiation protection question is surely whether there is a need for cephalograms for much orthodontic work and, if there is, whether we should be improving beam collimation rather than relying on bits of lead hanging on the patient. In Europe, where “individual justification of exposures” is enshrined in national laws, cephalograms are not routinely used in orthodontics, but selected on the basis of individual need (e.g. no ceph in simple orthodontics with no skeletal discrepancy) and PA ceps are almost never used. Furthermore, appropriate beam collimation to the areas used for cephalometric tracing seems the obvious answer.

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)
1. The authors should address the points raised above. In particular, they should consider whether the use of the thyroid shield matters in comparison with the issue of whether cephalograms are necessary at all and that of using better collimation.
2. P 13: last paragraph, beginning “Oversight is important.” This whole paragraph is semi-intelligible waffle and should be deleted.
3. P 15, paragraph beginning “In the absence...” I got lost here. Why should the orientation of the film influence the amount of tissue exposed? The amount of tissue exposed depends on the beam collimation; turning the film round through 90 degrees doesn’t change anything. Similarly later, the authors argue that the reason children and females have more exposed neck structure is because “film sizes are constant.” The film size is irrelevant.
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Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)
P 2: abstract. I have the typical basic stats knowledge of a dental radiologist, but I do not understand the term “secular variability.”
P 3: lines 2-6: the sentence ends abruptly “something is missing.”
P 5: line 4: can the authors clarify what they mean by a “systematic sample”?
I was also a little confused by the dates “July and November 2005”, as later it is clear that the data were obtained from radiographs taken between 1973 and 2003. It does not say in the Methods section that the sample was an historical one taken over a twenty year period, unless I’m missing something.

P 6: the statement “The most inferior vertebra” At the end of the “Anatomical neck features” section is essentially repeated at the end of the subsequent section. I am not clear whether the entire ventral surface of a vertebral body needed to be present or any part of it for the vertebra to be considered the most inferior.

P 6: despite the figures of radiographs, I am still not quite sure how reliable or meaningful the “best guess” decision on thyroid shield versus lead apron really is.

P 6: Statistical analysis. I’m sorry, I do not understand the statistics described. That may be my fault, but the editor might ask a statistical expert to have a quick look at these.

P 8: what do “apical of the mandible” and “apical of the hyoid bone” mean?

P 8: penultimate line: “the most apical vertebrae that was” should say “the vertebra was” or “vertebrae were”.

P 14. Statement relating to increased scatter with thyroid shields (reference 26). I would hesitate to make this statement myself based on one paper in a very obscure journal. Unless all laws of physics are being altered, such a statement is bizarre. You do not get scatter in lead; you get photoelectric absorption. Thus it would not only absorb primary beam, but also absorb scatter.

P 14/15, paragraph beginning “Moreover”. While I appreciate a full discussion, this seems so far removed from the subject of the manuscript.

Discretionary Revisions (which the author can choose to ignore)

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of limited interest

Quality of written English: Needs some language corrections before being published

Statistical review: Yes

Declaration of competing interests:
'I declare that I have no competing interests'