Reviewer's report

Title: PET-CT in the sub-arctic region of Norway 2010-2013. At the edge of what is possible?

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Reviewer: Soeren Hess

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General comments

The aim is to “clarify whether a PET-centre in Tromsø offered similar availability to the whole population” – as this specific region is a vast and rather remote geographical area with challenging arctic and sub-arctic climate as well as great distances to other national PET centres before the establishment of local facilities.

Although the subject may seem trivial in a world where literature is abundant with papers on PET in every imaginable sub-population, I agree with the authors on the importance of equal availability of PET services in remote geographical areas outside major cities and Ivy League academic institutions.

Evaluating the feasibility and the clinical use, and overcoming the challenges in these settings are a key factor in dispersing this unique modality to the benefit of patients regardless of geography and socio-economics. As such, I find the subject and aim of the article of potential interest to a broader audience than the title and subject may lead one to believe at first glance.

That said, I think there are several issues concerning the choices of the data presented that hampers the papers impact in this particular field. Thus, I find the data rather bland without sufficient discussion in a broader context. Strictly speaking, this may be sufficient towards the aim, if the intention is a solely descriptive rapport on numbers. If the data were further discussed in a relevant clinical context with critical appraisal of the mere numbers, it would in my opinion greatly enhance the impact of the message and elevate the paper above the interests of local regional government politicians. It is not possible at present to fully ascertain the clinical impact of introducing PET-CT into the region – and although this may not be the intention of the article per se, I still think some of the conclusions are wrong. I shall elaborate further on this below, but my comments should be seen in the light of the abovementioned caveats regarding the possible aims(s) of this paper (see Major Compulsory Revisions below).

Major Compulsory Revisions

1. In the first sentence of the discussion (p.5, line 177) the authors state the documentation of “the frequency of PET-CT exams in northern Norway”. How about the rest of Norway? To compare frequencies within the region really
doesn’t say much about the impact of introducing PET-CT into the region – provocatively speaking such information may primarily be of interest in local interregional budgetary disputes. If compared to the rest of the country or comparable Scandinavian countries one might get a better picture of how PET-CT impacted the population of the northern region, and how it could be improved if not yet up to the overall standards and recommendations in Norway.

2. In the discussion, major disease entities from the authors’ institutions are covered on the basis of reviews and papers from other groups, but no clinical data other than basic demographics from the present population are presented. Although I acknowledge this is not intended as a clinical paper on diagnostic performance, to fully appreciate the importance and clinical impact of granting inhabitants of remote areas access to state-of-the-art methodologies, a certain qualitative assessment of the studies performed would seem necessary. Again, to put it to the extreme, a lot of PET scans may not do patients any good per se if the usage, quality and findings aren’t in accordance with the literature, and vice versa.

3. For instance, lung cancer patients are grouped into one with no discrimination between NSCLC and SCLC, and no discrimination between scan indications (e.g. staging, response evaluation et cetera). This may have greatly influenced the usage, as also stated in the second paragraph of the discussion (p.5) due to conflicting evidence in the literature between different subgroups and different indications.

4. The same goes for malignant melanoma. Although national guidelines are referred to, and despite the interregional similarities in incidence, no comparison with national figures are available, and again no clinical patient information are presented (e.g. staging, follow up, disease stages et cetera).

5. For CRC it is also proposed that the relative rare use despite a high incidence is in accordance with national guidelines (i.e. no routine place for PET-CT). But again, for instance the initial disease stages are an important missing factor, both in general and with regards to the patients who actually got an exam. If, for instance, the patients generally present later to the health care system due to less general accessibility and less availability of early diagnostics like endoscopy, the need for PET-CT would be obviated in many patients up front.

6. In cancer of unknown primary, no numbers are given as to the efficacy of PET-CT in your population – again one misses the opportunity to evaluate the true clinical impact of introducing PET-CT compared to conventional imaging.

7. The authors equate accessibility to the ratio of performed exams per inhabitants, but many other reasons could be in place. One possibility is a learning curve for the clinicians in referring or not-referring to PET (which might be suspected from the figure 3), but no such potentially alternative explanations are offered. Another potential confounding factor may again be patient delay – with great distances to health care facilities as stated in the background, patient may present later in more remote areas, and with obvious widespread disease
the need for PET may be obviated. In my opinion, the data generally lack incidence numbers and disease stages at diagnosis in these regions as compared to the rest of Norway to firmly establish the availability – only if the numbers are comparable, the accessibility can be assessed.

8. Along the same lines, the penultimate paragraph of the discussion states the number of PET exams to be 461/503 per million inhabitants and emphasizes the need to see this low figure in light of the relatively few PET-CT scanners in Norway. However, this is not possible since comparable numbers are not provided, and again it would be helpful to be able to correlate the numbers to the overall numbers of PET-CT exams and ratios per capita in the rest of Norway and other comparable countries.

9. It all leads to the conclusion that further PET-CT scanners are planned as well as a PET-MRI and a local cyclotron facility – all initiatives to further strengthen availability of PET exams within the region to adhere to national and regional standards of care. But the data fail to enlighten whether this is actually needed with respect to patient impact in the region as compared to the rest of the country.

Minor Essential Revisions

1. The Background section (p.3, lines 66-71) introduce some common statements on the use of PET in lung cancer. This seems a little misplaced here since the article is not focused on lung cancer per se.

2. P.5, line 154 mentions substantial extra costs from the health care point of view. An explanation would improve the understanding of the statement.

3. In the discussion on lymphoma (p.7), several concepts are introduced without proper explanation to readers not familiar with nuclear medicine techniques, i.e. Cheson criteria, SUVmax, MTV, and TLG.

4. I find figure 1 to be important to readers not familiar with Norwegian geography, but in its present form it is insufficient and with too low resolution. It is impossible to differentiate the three regions, and I miss a mark for the other PET facilities in Bergen and Oslo. Furthermore, there is a red correction line from the word processing software remaining below the word Helsinki.

5. The paper is generally well written, but a little more proof reading would further enhance the reading experience, cf. the below mentioned examples:

6. P.3, line 106: In the sentences concerning distances, “were” should probably read “are” since the distances have hardly changed since the data were gathered.

7. P.3, line 79: The sentence “published a future need” is a bit clumsy – it is not the future need which was published, but rather a report on or a statement regarding the future need.
8. P.5, line 180: “the distance” should probably read “the differences in distance
9. P.7, line 248: “in example” should read “for example”.
10. P.7, lines 250-252: The sentence “The potential prognostic …” is a bit clumsy – i.e. it was not the potential impact which was published, but rather a report on the potential impact.

Discretionary Revisions

1. The use of company names seems a bit extensive and detailed, e.g. it is hardly important that the airline was Finnair.

2. The abbreviations A0 and A1 (p.4, lines 113-114) referring to the formula for radioactive decay seem unnecessary. Besides, they are hardly commonly known outside the field of nuclear medicine.

3. Figure 2 is a bit trivial and hardly necessary.

Level of interest: An article of limited interest

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests