PhD by published work

Title: Development of evidence-based practice in advanced radiotherapy through clinical trials quality assurance

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July 2018

Abstract

Aims

This thesis aimed to demonstrate the influence of trials quality assurance (QA) on the development of evidence-based practice in advanced radiotherapy.

Methods

With a lack of published literature on the influence of trials QA on the clinical implementation of advanced radiotherapy techniques, this thesis identified this knowledge gap and examined the influence of trials QA through eight multi-authored publications included within this thesis. All publications were critically evaluated to illustrate the author's unique contributions to new knowledge on evidence-based practice through the development of a national radiotherapy dosimetry audit on the implementation of advanced radiotherapy (publications I, II and III), trial radiotherapy planning dosimetry data analysis (publications IV, V and VI), and the analysis of the influence of trials QA on the implementation of advanced radiotherapy (publications VII and VIII).

Results

The unique contributions to new knowledge from each of the eight publications are:

Publication I - how a novel QA test can be developed and validated and the test is suitable for credentialing advanced radiotherapy.

Publication II - a new effective dosimetry audit approach utilising a commercial detector array is suitable for credentialing advanced radiotherapy.

Publication III - new national benchmark QA standards in advanced radiotherapy are generated through facilitating a dosimetry audit for future clinical trials and QA audits.

Publication IV- breast size remains a significant risk factor for late complications post radiotherapy even with the use of advanced radiotherapy techniques.

Publication V - use of hypofractionated treatments for breast cancer do not increase the residual effects of dose inhomogeneity on outcomes when advanced radiotherapy techniques are utilised.

Publication VI - new QA standards on assessing hypofractionated breast radiotherapy plans are generated from trials QA analysis.

Publication VII - clinical trials and trials QA are seen as a catalyst for implementing new radiotherapy techniques and improve the standard of care in both trial participating and non-participating centres

Publication VIII – being involved in a clinical trial leads to safe adoption of advanced radiotherapy techniques at the individual centre for both trial and non-trial patients.

Conclusion

The critical evaluation analysis included in this thesis has provided evidence of the author's unique contributions to new knowledge through his trials QA publications which addressed the research question of this thesis examining how trials QA can influence the development of evidence-based practice in advanced radiotherapy.