Remote Radiotherapy Treatment Planning from Home: Its Implementation and Potential for Further Development in a UK Centre

H. Weatherburn, 1 H. D’Souza, 2 M. Agujo, 1 C. Famelton, 2 C. Hurd, 3
1 Physics, 2 IT and 3 Radiotherapy Departments
Cancer Centre London, 49 Parkside, Wimbledon, London SW19 5NB

Introduction

Decentralised radiotherapy services are facilitated by telemedicine, enabling remote radiotherapy treatment planning (teleplanning) and aspects of quality assurance of treatment delivery to be undertaken. Digital storage of relevant data and an efficient and reliable telecommunication system between satellite units and the main radiotherapy clinic have been seen as the main prerequisites, with security being based on a firewall and a virtual private network (VPN) (ref. 1). Three levels of support have been identified, including “third level” real-time, remote operations (such as remote target volume delineation) (ref. 2), which will be the focus of discussion here.

There have been reports of implementation of such developments in radiotherapy treatment planning, which have allowed staff at a Satellite Centre to obtain support from a central institution such as a Cancer Centre or University / Teaching Hospital, employing the network security arrangements described (ref. 3). Such arrangements are also offered on a commercial basis in the US, where they typically involve a 2 to 4 week locum assignment for a dosimetrist to become familiar with local protocols (ref. 4). However the establishment of procedures and the operational use of these developments for radiotherapy target volume delineation and treatment plan approval from home by clinical oncologists has attracted less attention and it is the development and implementation of such teleplanning from home and which is described here.

Method

In 2008 Cancer Centre London (CCL) implemented use of “CMS Direct Access”, a distributed treatment planning system with secure remote internet access capabilities, to allow consultant clinical oncologists to undertake such tasks at their convenience from home, in order to enhance the accessibility and use of treatment planning applications (ref. 5). This gave them flexibility, in that they did not need to attend the Centre specifically to delineate “mark-up” target volumes on CT scans (sometimes fused with MR scans) for radiotherapy treatment planning, or to approve the radiotherapy treatment plans produced. In turn, this allowed them the opportunity of improving their productivity by use of these facilities for planning private patients “out of hours” from home. Engagement of clinicians was essential in that the consultant clinical consultants also required training in use of the system and, while this was undertaken at CCL, this could have been undertaken elsewhere. The attached Radiotherapy Flowchart (fig. 1) illustrates the treatment process in its entirety and the Radiotherapy Treatment Planning Flowpath (fig. 2) details the current internet based procedures which are followed at CCL for more complex radiotherapy treatment planning (flowpaths #3 & #4), i.e. conformal and inverse planned IMRT.

Discussion

The development of procedures and the implementation of “Direct Access” for home internet use encountered difficulties not reported for an intranet Satellite Centre system. While a minimum specification for the home computer / laptop, upload and download line speeds were provided, operation of “Direct Access” was “clunky” if these were used, e.g. normally smoothly rotating CT images “lurched” as they rotated. Recommended higher level specifications for smooth operation were developed following CCL Physics & IT staff undertaking home testing. “Home visits” were also undertaken to clinicians’ homes to set up systems and test their operability. Where issues were found, high specification laptops were made available to consultants for this task and the upgrading of home internet access, e.g. to Virgin fibreoptic broadband or BT Infinity was considered.

Conclusion

This is a concrete example showing that care pathway transformation of radiotherapy treatment planning is achievable. The development of procedures and recommended specifications for laptops and broadband upload and download speeds have resulted in the implementation of an operational system for home teleplanning via the internet and its further development, to include intranet teleplanning from a Satellite Centre for a wider range of patients, is under active consideration. This should also allow further transformation of the system to take place at a reduced expenditure, as only system upgrades will be required.

References