Summary

TELEMEDICINE AND RADIATION ONCOLOGY: STATE OF THE EVIDENCE

Radiation therapy is a therapeutic modality that uses ionizing radiation to treat cancer or improve its symptoms. With surgery and chemotherapy, it is part of the standard therapeutic approach for treating cancer. It is delivered through sophisticated technological infrastructures and by specialized human resources working together in multi-disciplinary teams.

The literature consulted on radiation therapy revealed two major findings: (1) cancer incidence is increasing in the industrialized world, including Canada and Québec; and (2) oncology centres are generally concentrated in large cities, while treatment needs are geographically dispersed. This situation leads to suboptimal radiotherapy service delivery.

In Québec, strong actions have been taken over the past few years to enhance the provision of radiotherapy services. Québec now has 52 linear accelerators divided among 10 centres, giving a ratio of 6.8 linear accelerators per million inhabitants, which is equivalent to that of other industrialized regions. Even so, radiotherapy service needs are still not being met because of Québec's dispersed population over a vast area and the nature of treatment protocols, which consist of multiple sessions generally spread over weeks or months, obliging patients to spend long periods away from home for treatment at radiotherapy centres. These types of protocols impose major burdens and inconveniences on patients and families who live in remote areas.

Faced with the reality that technical and organizational infrastructures are closely tied to population density, some countries have explored the use of telemedicine in radiation oncology as a possible solution. The primary purpose of this literature review was to examine telemedicine applications in radiation oncology and their potential modes of operation so as to draw lessons useful to Québec.

The scientific literature consulted revealed that telemedicine allows for patient follow-up, remote medical consultation and remote training sessions. Moreover, several projects have carried out concrete experiments in remote radiation treatment planning and simulation. Remote treatment planning experiences in Europe, Asia, Australia and the United States have yielded very good outcomes. Remote simulation and planning are now possible owing to advances in telecommunications, especially the DICOM interoperability standards. Clinical and imaging data are transmitted to remote specialized centres to allow them to establish treatment protocols. Such remote activities have several benefits, including the creation of networks between different centres and the contribution of telemedicine to decentralizing radiotherapy services by providing satellite centres with access to expertise not available on site. That translates into rapid communication of treatment plan information, leading to improved patient services.

Although radiation oncology has well-established practice standards for safeguarding each treatment, the telemedicine component adds complexity to the security measures to be taken. This will require taking into account the risks involved in transmitting, storing and handling clinical and imaging data in centres other than those of patients and treating physicians with a view to minimizing errors. In this respect, transmission through a secure telecommunications network like Québec's Réseau de télécommunications sociosanitaire (RTSS) offers additional insurance.

The literature scarcely addressed the medico-legal liability issues raised by remote treatment

planning and simulation and the economic issues surrounding this therapeutic modality. These issues will require further study.

In conclusion, this literature review showed that the main application of telemedicine in radiation oncology is remote treatment planning. It can contribute to networking different centres and to decentralizing radiotherapy services by providing satellite centres with access to expertise not available on site. However, the success of this activity depends on implementing a stringent quality-assurance process.