Implementing *in vivo* dosimetry

British Institute of Radiology

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Towards Safer Radiotherapy[1] addresses the broad question of improving safety in radiotherapy departments. It makes a number of key recommendations on important areas, one of which is for every radiotherapy centre to have protocols for *in vivo* dosimetry (IVD) monitoring to be used at the beginning of treatment for most patients. This intervention was also recommended in the Annual Report of the Chief Medical Officer (CMO) for 2006.[2] The CMO has agreed that cancer networks, and their constituent primary care trusts (PCTs), should be asked to include the phased introduction of IVD into their forward plans for radiotherapy, which they will be developing in response to the Cancer Reform Strategy.[3] In addition, he has asked the relevant professional organisations (The Royal College of Radiologists [RCR], Institute of Physics and Engineering in Medicine [IPEM], the Society and College of Radiographers [SCOR] and the British Institute of Radiology [BIR]) to develop guidance on which patient groups should receive the highest priority for IVD during the period of capacity building. This short note is a response to this request.

It will generally not be practicable, and it is possibly inadvisable, to attempt to introduce routine IVD monitoring for all of the intended groups of patients at the same time. During the time in which IVD capacity is being built up, radiotherapy centres will have to decide which groups of patients should be prioritised for routine IVD monitoring.

The order in which IVD is phased in for different treatment categories may be determined by local circumstances such as a centre's previous experience with IVD and by practical considerations. For example, if hardware (cabling, detectors and so on) has to be installed on the linear accelerators or instrumentation installed in a laboratory, these could be protracted processes with significant financial consequences. In cases where this is necessary, there will be a parallel need to identify the groups of patients that should be monitored with IVD during the capacity building phase.

The following notes for radiotherapy organisations are intended to highlight a range of issues to be considered en route to the full implementation of IVD. They are not intended to limit the range of options available to radiotherapy centres or to be prescriptive.

Funding a new or expanded service

As IVD has become a requirement, it will become necessary for the tariffs to reflect this or for commissioners and providers to make the necessary local financial arrangements to ensure adequate resources are available. Resources to be considered are financial, material (equipment) and human. The capital and revenue implications and the cost of the impact on linac throughput have recently been discussed in the *British Journal of Radiology*.[4–6] These articles may form a useful starting point for discussions with commissioners and cancer networks.

Failure to ensure that adequate resources are available will increase the risk to radiotherapy waiting times and the timely implementation of other clinically beneficial technologies.

In relation to human resources, consideration should be given to the establishment of appropriate posts, recruitment and training within the context of workforce strategies at local and national levels.

Rolling out the system across patient groups

The priority for rolling out IVD should be first on the basis of risk and second on the basis of more practical issues, including the availability of resources.

Risks of errors increase when new equipment is commissioned, when treatment techniques are first introduced or changes made. They are also higher for non-standard treatments where a final 'sanity check' of the results of a series of calculations is not possible because the experienced operator will not have an expected range of results in mind. There is a particularly high risk where it has not been possible to eliminate the manual transcription of data.

If dosimetry equipment is to be permanently installed in treatment rooms, consideration should be given to prioritising machines where the risk and consequence of error is highest.

Finally, recognising that IVD of some techniques is particularly challenging, it may be wise to avoid early implementation in these situations as to do so would risk high levels of false error reporting with consequent resource implications and loss of confidence in the process.

The consideration of the issues which will affect the priority for implementation are not independent. Decisions should be based on an overall assessment of risk, potential benefit and cost.

An advantage of building up capacity in a staged manner is that the results of all measurements can be reviewed initially, not just out-of-tolerance ones, without the workload in so doing becoming excessive. Acceptable tolerance levels, which may, to a certain extent, be system dependent can be finalised in the light of the initial data.

Throughout this process, time has to be given to training all of those involved in the measurement of data, its interpretation and continual refining of action levels as experience is gained. As with other areas of practice regular audit of IVD will ensure that the cost-benefit equation for the process is continually monitored and optimised.

Conclusion

It must be reiterated that the above notes are intended only to identify some of the issues that will arise when planning the commissioning of IVD in a radiotherapy centre. They are in no sense prescriptive, and individual centres must decide for themselves which of the many options available is best suited to their particular set of circumstances.

References

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