

Treatment of hyperthyroidism by radioactive iodine

SUMMARY OF A UK NATIONAL SURVEY PREPARED FOR THE ROYAL COLLEGE OF PHYSICIANS COMMITTEE ON ENDOCRINOLOGY AND DIABETES

The published literature on radioiodine therapy for hyperthyroidism reflects widely varying views on the optimal approach to treatment. This report summarises the results of a UK national survey of the treatment of hyperthyroidism by radioactive iodine prepared for the Committee on Endocrinology and Diabetes of the Royal College of Physicians. It collated information obtained by questionnaires between October 1988 and February 1991, from physicists and clinicians who treat hyperthyroid patients. The objectives of the study were the identification and description of:

- current prescribing patterns and workloads in radioiodine treatment;
- methods used for assessing radioiodine treatment and the administered thyroid dose;
- the reasons for the choice of a particular treatment regimen;
- the clinical services and types of follow-up care provided for thyroid patients;
- areas where standardisation of practice would be possible and beneficial in terms of clinical and economic outcomes;
- a framework for good practice within the European Community.

In 17 regions the response rate from physicists ranged from 100% (12 regions) to 67–89% (four

regions) and 0% (one region). A total of 83 physicists responded, of whom 75 (90%) administered radioiodine for hyperthyroidism. The physicists' returns identified 307 clinicians apparently involved in the treatment of hyperthyroidism; 245 of them eventually responded to the enquiry of whom 216 prescribed ¹³¹I. Only 67% of the clinicians who prescribed ¹³¹I had a licence for this from the Administration of Radioactive Substances Advisory Committee (ARSAC). An additional 15 prescribing clinicians were identified from the ARSAC register.

Results and comment

Workloads and prescribing patterns

Workloads: The numbers of patients treated in 1988 ranged from 1 to 120 per centre in 80% of centres, and 121 to 600 in the others, corresponding to regional treatment rates of 0.6 to 4.4 per 10,000 population.

There are marked differences between the physicists' and clinicians' estimates of workloads; fewer clinicians stated that their returns were based on precise records, and their data are probably inaccurate.

Workloads vary widely between treatment centres; this variation may have implications for the training of senior staff and for the adoption of some of the recommendations made in this report.

Regional variations in treatment rates are not explained by the completeness of the survey responses.

Responsibility for prescribing: The responsibility for prescribing radioiodine varies widely between centres. It lay with the doctor attending the patient in 38% of centres, with another doctor in 27%, a combination of these two in 24%, with physicists alone or with an attending doctor in 6%, and other combinations in 4%. In 32% of the centres the attending doctor did not participate in the decision.

There is clearly a need for special arrangements to be made in many centres to 'cover' unlicensed clinicians who undertake the care of thyroid patients. The role of the attending clinician in selecting and prescribing radioiodine should be considered, and the criteria for the acquisition of a licence should be reviewed.

A. J. HEDLEY, MD, FRCP, FFPHM, *Professor of Community Medicine, University of Hong Kong*

J. H. LAZARUS, MD, FRCP, *Senior Lecturer and Consultant Physician*¹

S. M. MCGHEE, PhD, *Researcher and Clinic Manager*²

R. B. JONES, MSc, PhD, *Lecturer in Health Informatics*²

P. F. SHARP, PhD, FIPSM, *Professor and Acting Head, Department of Bio-medical Physics and Bio-Engineering, University of Aberdeen*

L. M. NAVEN, *Research Assistant*²

C. G. BEARDWELL, FRCP, *Consultant Endocrinologist, University Hospital of South Manchester*

R. HALL, CBE, MD, FRCP, *Professor of Medicine*¹

¹Department of Medicine, University of Wales College of Medicine, Cardiff

²Department of Public Health, University of Glasgow

N.B. The views expressed in this paper do not necessarily represent the views of the departments and organisations whose support and assistance is acknowledged at the end of this article.

If prescription is by another doctor, the implications for the care of the patient should be considered in relation to continuity of care in the short and in the long term.

This survey suggests that monitoring of radioiodine therapy would be facilitated by a complete and efficiently managed register of licensed prescribers, linked to the names of unlicensed consultants who routinely treat hyperthyroidism with radioiodine. The register, which should distinguish between clinicians who treat hyperthyroidism and those who treat cancer of the thyroid, could also function as a communication network and as a tool for carrying out future reviews of clinical practice.

Selection for treatment: Selection for radioiodine treatment is biased towards older people, but 15% of clinicians avoid it or use it only occasionally in the over-50s; 80% never use it in the under-20-year-olds, and there is much variation in opinion for its use in the intervening age groups.

A further enquiry might consider whether more of the younger patients could (and middle-aged and elderly patients should) receive radioiodine treatment in preference to other methods.

There is scope here for a more detailed audit of clinical decision-making, and in future the choice of radioiodine could be based on a consensus derived from more explicit criteria.

Radioiodine treatment

Terminology: Standardisation of key terms, including the definition of radioiodine activities and dose levels, should be considered. The present situation whereby there are many variations in the terminology used is confusing, and prevents the efficient exchange of information.

Radioiodine preparations: The wide variation in the use of liquid (54%) and capsules (28%) or both (18%) indicates that there is no agreement on the criteria for using these different preparations. The current criteria for using liquid or capsules need to be reviewed and better guidelines developed for routine practice, particularly in relation to costs and benefits under different working conditions. Initial studies suggest that capsules cost 1.4 times as much as liquid preparations of radioiodine.

Activities and doses: While half of the prescribers employ a fixed activity level (range 111–740 MBq), the remainder attempt some form of dosimetry based on arbitrary scales (Fig. 1), or 'precision dosimetry' with the use of formulae. In any future review it should be considered whether manipulation of activities administered, for example in precision dosimetry, leads to additional benefit in comparison with more arbitrary methods of selecting activities. The basis for the 'precise' estimation of activities to be administered is the assumption that it avoids post-treatment hypothyroidism. However, considerable error is attached to

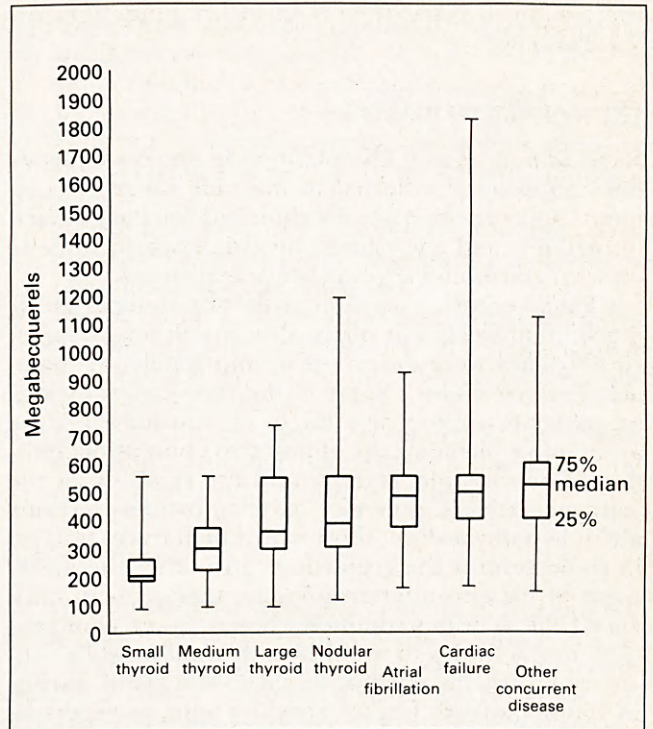


Fig. 1. Quartile distribution of radioiodine activity levels (MBq) quoted by clinicians using 'arbitrary scale' assessment methods. The box plots show range, 25%, 75%, and median values.

the methods used to estimate the administered activity. In addition, attempts to avoid hypothyroidism inevitably lead to higher levels of persistent hyperthyroidism, and there is no significant lowering of total morbidity. Previously published reports and this study suggest that neither the concept nor current practice of precision dosimetry offers support for the argument that it improves treatment outcomes. It should therefore be avoided.

Fixed activity treatments are recommended for the majority of patients, using higher activity levels than those employed in many centres; activities in the range 500–550 MBq are suggested as a basis for further discussion. Even higher activities (for example, up to 900 MBq) should usually be employed for patients with special clinical problems, including atrial fibrillation and heart failure.

Retreatment with radioiodine: The optimal timing for retreatment with radioiodine for persistent hyperthyroidism should be reconsidered and the reasons for the wide variation in current practice clarified. If the benefits for earlier (≤ 3 months) retreatment perceived by 22% of respondents are accepted, the practice of delaying retreatment for up to 12 months by the remaining 78% could be revised. Even allowing for individual patient needs and other variations, there are strong grounds for considering the rationale for

the timing of retreatments in future guidelines on good practice.

Choice of different regimens

Radioiodine treatment: The variation in choices of activities and doses is reflected in the wide range of comments and reasons given by clinicians for their choice of regimen, and emphasises the wide disparity of views on what constitutes appropriate management.

Clinical criteria and their definitions, employed in drawing up treatment plans, also varied; for example, small glands were described as impalpable, or 'palpable and just visible'. Some of the views follow expected patterns while others might be considered to be arbitrary or diametrically opposed to conventional wisdom. For example, some would use small doses for younger patients, potential parents, patients anxious about hypothyroidism, those with a high tracer uptake; in some centres the regulations governing the movement of patients after radioiodine therapy had influenced the activities routinely chosen. Some clinicians used low activities to avoid hypothyroidism while others would usually attempt to ablate the gland, except in young patients. Higher activities were, as expected, more often used in larger goitres, cardiac problems, and other serious concurrent illness, but the perception of what was appropriate treatment varied greatly within these groups. As a result, some patients who would ordinarily be regarded as eligible for large doses to the thyroid received low activities.

Overall, it was difficult to see what, if any, logic governed the choice of treatment in many instances; this suggests that a thorough reappraisal of the criteria adopted by different clinicians is necessary and perhaps further investigation of the outcome of some of the regimens.

Supplementary therapy (ST): A total of 83 comments were offered on this aspect of management, though the reasons for using ST were often not explicit and many clinicians have no set practice. Antithyroid drugs were used before radioiodine by 16%, after it by 50%, while 34% used both types of regimen. In those who treated patients before radioiodine, 36% of all patients received beta blockers, 22% received beta blockade and thionamides, and 14% were treated with thionamides alone. In the group who used ST after radioiodine, thionamides were most preferred (29% of patients), followed by beta blockade (17%), and a combination of the two (13%). The presence of severe symptoms was a common reason for using ST, together with cardiac problems and advanced age. Some used beta blockade and would never use antithyroid drugs for 7–10 days before radioiodine, but others usually employed antithyroid drugs, in which case radioiodine administration was likely to be delayed.

Retreatment with radioiodine: Information on the use of repeat treatments was qualified by 66 additional statements comprising a series of preferences and opin-

ions. There was a general tendency to defer retreatment, and 21% of respondents would not consider further administration of radioiodine until at least 9 to 12 months had elapsed; 65% would use it more readily, for example at 3 to 6 months when the response was slow or incomplete.

Services for thyroid patients

Thyroid clinics

Only a minority of clinicians (30%) hold separate thyroid clinics. Most of these are in larger centres; elsewhere patients are seen within general medical and other specialist clinics. This is likely to have been an increasing trend in recent years, and might be seen as a further reason for establishing a system of audit to support quality assurance, as the patients and services provided become increasingly dispersed. The priority and the resources which can be allocated to these patients may vary with the workloads in different centres: in some this is very high, and in others amounts to less than one new patient per week.

Diagnosis

Initial diagnostic testing strategies for hyperthyroidism vary widely. Fifty-two different testing strategies comprising 1–5 combinations of tests were recorded, 65% of them including three or more tests. The use of multiple tests is a particular area where consensus, with improved cost-effectiveness, could be achieved.

If real benefits are to be gained in the efficiency of diagnosis by using immunometric assays for TSH, they are not being achieved by 60% of clinicians. Furthermore, the reasons why 36% use radioimmunoassay to measure TSH are not clear.

Guidelines aimed at test reduction, based on available data on the predictive value of tests, should be established and evaluated for their effectiveness in routine practice.

Follow-up

Follow-up practices vary widely; computer-assisted shared-care systems with fail-safe follow-up plans are used by only 23% of the responding units, but this approach offers at least a 40% reduction in the cost of long-term care.

There should be further consideration of shared-care arrangements in all centres, and avoidance of unnecessary outpatient attendance for low-risk patients.

There is also scope for better liaison between specialists and general practitioners, and agreed guidelines for long-term care, whichever care arrangements are used. Each specialist service, in collaboration with general practitioners, should have a method for maintaining contact with, and monitoring and evaluating

the health of, patients treated by radioiodine (and also surgery and thyroxine replacement) through their lifetime. A recommendation along these lines should go to all health authorities, in addition to individual clinicians, so that the organisational and resource implications (including those raised by the new contracts) can be considered.

Evaluation of care

The findings demonstrate the need for better information systems to facilitate review and audit, of the kind attempted in the survey.

There are problems in identifying clinicians who use radioiodine in the treatment of hyperthyroidism and, in turn, many clinicians have difficulty in reporting on their patient populations in terms of numbers and their usual clinical practice; some do not accept the need for this approach.

Recommendations

- A new multidisciplinary working group should be formed, comprising clinicians (specialists and general practitioners), physicists, an epidemiologist, and a health-care administrator with appropriate background interests and experience. The group should plan, implement, monitor, and assess new approaches to quality assurance in the radioiodine treatment of hyperthyroidism.
- The specific points to be addressed by the new group might include:
 - (a) selection criteria for radioiodine treatment, with particular reference to the patient's age;
 - (b) licensing arrangements for clinicians and guidelines on how shared responsibility for contin-

uity of care should be approached when prescribing is delegated to others;

(c) promotion of a consensus on good practice, including the use of standard terminology, the choice of radioiodine preparations, and methods for assessing the activity of treatments administered;

(d) development of guidelines for the most cost-effective approach to the long-term management of radioiodine-treated patients.

- Each treatment centre should set up and maintain a clinical register and information system capable of yielding many of the items which formed the data base for this study.
- There should be a wider acceptance of the type of evaluation procedure presented in this report, by all clinicians who treat thyroid disease.

Acknowledgments

We gratefully acknowledge the funding of this project by the Chief Scientist Office, Scottish Office Home and Health Department and the support and practical assistance of the Committee on Endocrinology and Diabetes of the Royal College of Physicians of London, the Department of Health and the Institute of Physical Sciences in Medicine. We thank Professors D. Hadden and M. C. Sheppard for helpful discussion. We also thank all the physicists and clinicians who completed the questionnaires—especially those who did so legibly.

Address for correspondence and requests for copies of the full report (price £6.00): Dr Sarah McGhee, Department of Public Health, University of Glasgow, Glasgow G12 8RZ.