Consensus statement for good practice and audit measures in the management of hypothyroidism and hyperthyroidism

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Thyroid disease is common and may present to a wide range of doctors. With the widespread availability of thyroid function testing in recent years increasing numbers of patients with symptoms which might be attributable to hypothyroidism and hyperthyroidism are being tested. Many aspects of the management of thyroid disease have not been subjected to controlled clinical trials yet there are established practices which have never been questioned. The Research Unit of the Royal College of Physicians of London, the Endocrinology and Diabetes Committee of the college, and the Society for Endocrinology set up a working group to produce a consensus statement for good practice with associated audit measures which could be used to ensure that purchasers of health care are obtaining an acceptable standard of care for patients with thyroid disease. The working group focused on patient management rather than presenting symptoms and signs, which were detailed in a similar report by the American Thyroid Association.[1]

This report summarises the consensus views reached by members of the working group.

Methods

Recognised United Kingdom authorities with an international reputation for clinical research as thyroid specialists were invited to produce background papers on specific aspects of the topic which summarised the relevant available published evidence from peer reviewed journals (see contributors of background papers listed at the end of this report). Because of the potential for bias in consensus development by small groups the background papers were circulated to members of a larger working group before a workshop held at the Royal College of Physicians of London. The working group consisted of specialists in endocrinology, general physicians, thyroid surgeons, general practitioners, clinical biochemists, representatives of thyroid disease patient groups, and purchasers of health care (see members of the working group listed at the end of this report).

The workshop consisted of a brief (10 minute) introduction to each background paper followed by rigorous debate (30 minutes per section) and the recording and agreement of the consensus view on each topic. When more than one acceptable approach to management existed these strategies were incorporated as options of acceptable standards. The management of thyroid storm and myxoedema coma was not discussed, as these conditions are rare in the United Kingdom. After the workshop a summary of the discussion was circulated to all contributors of the background papers so that they could amend these if they wished. A small group abbreviated the salient points in order to produce a concise consensus statement for good practice, which was evidence based when possible. This was circulated to all members of the working group, inviting comments and approval. In this report the points specified and agreed for future audit both in primary care and in secondary care are indicated by "(audit)."

Recommendations for acceptable practice

SCREENING FOR THYROID DYSFUNCTION

The evidence from community studies is that general testing of the population detects only a few cases of overt thyroid disease and is therefore unjustified.[2,3] This applies even to high risk groups such as women over 60 and those with a strong family history of thyroid disease. There are, however, exceptions:

- Screening for congenital hypothyroidism is appropriate and should continue
- Surveillance of patients who are at high risk of iatrogenic hypothyroidism because of previous thyroid surgery or treatment with radioiodine should continue or be instituted (audit)
- There is no consensus yet on whom to screen for postpartum thyroiditis. Patients with type I (insulin dependent) diabetes mellitus are at particular risk[4] and may warrant screening in the first trimester of pregnancy by microsomal (thyroid peroxidase) antibody estimation to identify those who should be followed up post partum (audit)
- Hypothyroidism is common in patients receiving long term lithium, and regular testing of thyroid function is recommended.[5] Treatment with amiodarone may result in hypothyroidism or hyperthyroidism which may be difficult to detect clinically. Thyroid function testing is recommended when there is evidence of deteriorating cardiac function or weight loss. Early specialist referral is advised in view of the difficulties in interpreting biochemical abnormalities.

DIAGNOSIS OF THYROID DYSFUNCTION

- The diagnosis of thyroid dysfunction must be confirmed biochemically
- To confirm the diagnosis of hypothyroidism or hyperthyroidism concentrations of serum thyroid stimulating hormone and total or free thyroxine (direct or indirect) must be measured
- Isotope uptake studies and thyroid antibody assays need be performed in selected patients only.

REFERRAL TO SPECIALIST

The pattern of referral will depend on:

- The presenting signs and symptoms
- The expertise of the doctor making the referral
- Access to a specialist
- Local circumstances
- Patient preference.

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A clinical team managing a patient with thyroid disease should have the following expertise or facilities (audit):

- An understanding of the underlying pathogenesis of thyroid disorders
- Access to the latest thyroid function tests
- Access to nuclear medicine facilities
- Access to ophthalmological opinion
- Access to an experienced thyroid surgeon
- A clear treatment and monitoring plan with an understanding of the risks, benefits, and individual appropriateness of different treatment modalities
- Awareness of the psychological needs of patients with thyroid disease and access to a specialist nurse or patient self help groups for support if requested
- Availability of informed staff to discuss any queries after the initial consultation—for example, a specialist nurse
- Access to a centralised thyroid disease register (preferably computerised) to improve the surveillance of patients treated for thyroid dysfunction[6]; there should be an effective audit procedure to ensure quality of information and follow up care provided by the system used.

Any patient with hyperthyroidism can reasonably expect to be referred for a specialist opinion at diagnosis. A patient with hypothyroidism can expect to be referred for a specialist opinion if:

- Aged less than 16
- Pregnant or post partum
- There is any evidence of pituitary disease
- A newborn infant
- There are particular management problems—for example, ischaemic heart disease or treatment with amiodarone or lithium.

TREATMENT OF HYPOTHYROIDISM

Thyroxine is the treatment of choice in hypothyroidism.

Dosage

- The initial dose of thyroxine should normally be 50-100 μg daily. Measurement of serum thyroid stimulating hormone concentration after six weeks will indicate the need for dose adjustment by 25-50 μg increments
- In older patients—especially those with evidence of ischaemic heart disease—the initial dose should be 25 μg daily and increased every three to four weeks by 25 μg increments
- The correct dose is that which restores the euthyroid state and relieves symptoms. In most patients these will be achieved by a dose of thyroxine resulting in a normal or slightly raised serum thyroxine concentration, a normal serum triiodothyronine concentration, and a normal or below normal serum thyroid stimulating hormone concentration. Controversy exists concerning whether doses of thyroxine which suppress serum thyroid stimulating hormone concentration to below normal are associated with an increased risk of osteoporosis[7]
- The dose of thyroxine in patients rendered hypothyroid by treatment for well differentiated thyroid cancer should be sufficient to suppress the serum thyroid stimulating hormone concentration below normal.

Variation in dosage

- Once the appropriate dose of thyroxine has been established it remains constant in most patients
- In pregnancy there may be a need to increase the dose by at least 50 μg daily to maintain normal serum thyroid stimulating hormone concentrations.[8] Serum thyroid stimulating hormone concentration should be measured in each trimester (audit)
- In order to improve compliance and take account of possible variations in dosage caused by concomitant drug treatment—for example, anticonvulsants—serum thyroxine and thyroid stimulating hormone concentrations should be measured yearly (audit).

Subclinical hypothyroidism

- The term subclinical hypothyroidism is used to describe patients with normal serum thyroxine and raised thyroid stimulating hormone concentrations who do not have symptoms
- In patients with microsomal (thyroid peroxidase) antibodies treatment with thyroxine is recommended, as the conversion rate from subclinical to overt hypothyroidism is at least 5% a year
- In patients whose serum thyroid stimulating hormone concentration is only slightly raised (less than 10 mU/l) without thyroid antibodies it is acceptable to defer treatment provided that secure follow up can be achieved as the conversion rate to overt hypothyroidism is less than 3% a year. However, the higher the serum thyroid stimulating hormone concentration the greater is the likelihood of hypothyroidism.[9]

Ischaemic heart disease

- Initiating treatment with thyroxine in patients with symptomatic ischaemic heart disease should be done with caution, as worsening angina, myocardial infarction, and sudden death are all recognised complications of increasing the metabolic rate in patients with a compromised coronary artery circulation (audit)
- Untreated or inadequately treated hypothyroidism is not an absolute contraindication to coronary angioplasty or coronary artery bypass surgery.

Transient hypothyroidism

- In certain circumstances hypothyroidism may be temporary—for example, in postpartum thyroiditis[10] and in the first six months after subtotal thyroidectomy or radioiodine treatment for Graves' disease. If symptoms require that thyroxine should be prescribed an attempt should be made to withdraw it after three to six months
- If there is any doubt about the need for thyroxine it should be stopped and the serum thyroid stimulating hormone and thyroxine concentrations measured four to six weeks later.

MEDICAL TREATMENT OF HYPERTHYROIDISM

Indications for treatment with thionamides (thiourea derivatives)

- Prolonged course in patients with a first episode of Graves' hyperthyroidism in the hope that long term remission will be achieved
- Short term treatment (one to three months) before definitive treatment with radioiodine or surgery in patients with relapsed Graves' hyperthyroidism, those presenting with Graves' disease at age over 40, or those with toxic nodular hyperthyroidism
- Thionamides are ineffective in thyrotoxicosis secondary to thyroiditis.

Choice of thionamide

- Both carbimazole and propylthiouracil are effective
- Once daily treatment (and hence better compliance) with carbimazole means that carbimazole is the drug of choice
- Both drugs are safe in pregnancy if treatment is monitored frequently by an experienced physician.

There is a possible association of carbimazole with fetal aplasia cutis[11]; hence some physicians recommend substituting propylthiouracil for carbimazole in pregnancy

• Treatment with thionamides does not preclude breast feeding. As propylthiouracil is excreted less in breast milk[12] it is preferable to use this agent at the lowest effective dose. Patients already receiving carbimazole need not normally change provided the dose is 20 mg or less daily.

Treatment regimens and outcome

• Carbimazole may be given in reducing doses (typical starting dose 15-40 mg daily as a single dose depending on the severity of hyperthyroidism),[13] titrating treatment against serum thyroxine concentrations checked at four to six week intervals until a maintenance dose (5-15 mg daily) has been achieved. Measuring the serum thyroid stimulating hormone concentration is unhelpful in the early stages of thiourea treatment (first three months) but after three months a rise in thyroid stimulating hormone concentration above normal indicates iatrogenic hypothyroidism and the need for dose reduction. When the patient is established on a maintenance dose follow up and measurement of serum thyroxine and thyroid stimulating hormone concentrations may be extended to three month intervals

• After euthyroidism has been achieved (one to six months after beginning treatment) thyroxine treatment (100-150 μg/day) may be added to high dose carbimazole (the "block-replace" regimen). This approach avoids iatrogenic hypothyroidism and repeated biochemical monitoring and dose adjustments.[14] The regimen is contraindicated in pregnancy because thyroxine crosses the placenta less well than carbimazole and fetal goitre and hypothyroidism may result

• When the aim of treatment is remission of Graves' disease the recommended duration of treatment is between six months and two years

• Even with prolonged courses of thionamide a long term remission rate of greater than 50% is unlikely to be achieved

• Long term treatment with 5-10 mg carbimazole seems to be safe and is an option for patients with relapsed Graves' disease or toxic nodular hyperthyroidism

• No specific clinical, biochemical, immunological, or genetic factors have been identified which predict long term remission in individual patients, but patients with a large goitre or severe hyperthyroidism are unlikely to enter remission.

Side effects

• Agranulocytosis, though rare, represents the most serious side effect of treatment with carbimazole or propylthiouracil. All patients starting treatment must be warned to stop and seek an urgent blood count if they develop a sore throat or other infection (audit). These instructions must be recorded in the patient's notes. Most cases of agranulocytosis occur within the first three months of treatment, though this complication can occur at any time regardless of dose, duration, or whether a previous course has been given. Mild neutropenia is associated with hyperthyroidism itself

• Agranulocytosis and other rare but serious side effects, including hepatitis and lupus-like syndromes, represent absolute contraindications to thionamide

• Pruritus and rashes are common but often resolve with continuing treatment. If these side effects necessitate a change in treatment carbimazole can often be changed to propylthiouracil without recurrence.

Use of β adrenergic blockers in hyperthyroidism

• β Adrenergic blockade should be considered in all patients with moderate or severe hyperthyroidism. They should not be used in patients with asthma and should be used with caution in those with heart failure (even if related to hyperthyroidism)

• All β adrenergic blockers are effective, but those which can be given once daily (such as atenolol or nadolol) are associated with improved compliance

• Treatment with β adrenergic blockers is indicated only until biochemical euthyroidism has been achieved by other forms of treatment

• β Adrenergic blockade is often the sole treatment required in thyrotoxicosis secondary to thyroiditis.

RADIOIODINE TREATMENT OF HYPERTHYROIDISM

The Royal College of Physicians of London has recently published a report on radioiodine treatment of hyperthyroidism.[15] The essential parts are summarised below.

Indications for radioiodine

• Radioiodine treatment is safe and is appropriate in nearly all types of hyperthyroidism, especially in elderly people

• Radioiodine is contraindicated in children, pregnancy, and women who are breast feeding. Women of childbearing age should wait four months after radioiodine before becoming pregnant

• Radioiodine should be given with caution in patients with Graves' disease complicated by active ophthalmopathy (audit). If radioiodine is used prophylactic steroids should be considered and hypothyroidism avoided.

Use of radioiodine

• Use of radioiodine may be authorised only by an ARSAC (Administration of Radioactive Substances Advisory Committee) certificate holder. A physician (who must see the patient before giving radioiodine) should liaise with the ARSAC holder to ensure radiation safety

• A patient information sheet should be supplied dealing with the period away from work, avoiding prolonged close contact with children, and rules concerning radioiodine treatment and pregnancy. The patient should be aware of the importance of follow up and continued surveillance, especially during the first year after treatment

• The patient should sign a consent form before treatment (audit)

• After treatment the patient should be given a warning card stating date, activity, and duration for which special precautions are necessary. A telephone contact number should be available on the card (audit).

Treatment regimens and outcome

• The amount (activity) of radioiodine given should be sufficient to achieve euthyroidism in most patients within two to three months with a moderate rate of hypothyroidism thereafter—for example, 15-20% at two years and 1-3% yearly subsequently.[16] An ablative dose of radioiodine with consequent higher rates of hypothyroidism is also acceptable (audit)

• If antithyroid drugs are given before and after radioiodine treatment they should be stopped at least four days before and restarted no sooner than three days afterwards. If a block-replace regimen has been used thyroxine and carbimazole should be stopped four weeks before radioiodine

- Thyroid function should be assessed four to eight weeks after radioiodine treatment (audit)
- If antithyroid drugs are restarted after radioiodine they should be withdrawn when the patient is euthyroid and thyroid function tested four to six weeks later. If the patient remains hyperthyroid further radioiodine should be given four to six months after the first dose
- Long term follow up must be made available to all patients with recommended checks of thyroid function at intervals of six to 12 months. Longer intervals are recommended only for patients with stable disease (audit).

SURGICAL TREATMENT OF HYPERTHYROIDISM

Indications for surgery

- Thyroid surgery is extremely safe in centres with an experienced surgical team and a high throughput of patients
- The objective of surgery is to cure hyperthyroidism without rendering the patient hypothyroid
- The principal indications are a large goitre, failed medical treatment owing to non-compliance, or side effects with antithyroid drugs, patient preference, and toxic nodular goitre
- Surgery is also an option for Graves' disease in pregnancy if antithyroid drugs are not tolerated and should preferably be performed in the second trimester
- In Graves' disease complicated by active ophthalmopathy steroids should be considered and periods of untreated hypothyroidism avoided
- The expected outcome of surgery for toxic nodular goitre is euthyroidism. At one year in Graves' disease about 80% of patients are euthyroid but permanent hypothyroidism occurs in 5-40% of patients and the prevalence increases with time (audit).[16] Recurrent hyperthyroidism occurs in 1-3% of patients in the first year, thereafter occurring at 1% a year.[17 18]
- Factors which influence outcome are age, gland size (small glands are more likely to lead to hypothyroidism postoperatively),[18] remnant size, and iodine intake[19] (high intake is associated with recurrence).

Surgical management

- Patients should be rendered biochemically euthyroid with thionamide before surgery (audit). β Adrenergic blockade given alone is not appropriate for routine preparation. Preoperative iodine probably has no beneficial effect
- Preoperative vocal cord check is done as a routine in some centres and should always be done in cases of reoperation (audit)
- Subtotal thyroidectomy is the usual procedure, the aim being to leave a remnant of less than 10 g
- Total thyroidectomy does not increase the surgical risk in experienced hands but results in permanent hypothyroidism[20]
- Recurrent hyperthyroidism after surgery is best treated with radioiodine
- The complications of surgery are haemorrhage and wound infections, recurrent laryngeal and external branch of superior laryngeal nerve damage, and transient (up to 20% of cases) and permanent (2%) hypocalcaemia (audit).[21]

Postoperative care

In the immediate postoperative period:

- Serum calcium concentration should be checked
- Antithyroid drugs should be stopped and β adrenergic blockers reduced gradually
- Length of stay should usually not exceed 48 hours after surgery (audit)

In the longer term:

- The patient should be aware of the risks of recurrent hyperthyroidism and long term hypothyroidism
- Thyroid function should be assessed around four weeks postoperatively, at three month intervals up to one year, and yearly thereafter (audit).

TREATING SPECIAL CASES OF HYPERTHYROIDISM

Hyperthyroidism in pregnancy

- Thyroid function should be assessed in all patients with hyperemesis gravidarum. If hyperthyroidism is detected supportive treatment is recommended initially, but if the condition is severe or persists into the second trimester antithyroid drugs are probably indicated[22]
- Women with a diagnosis of Graves' disease who intend to become pregnant may elect for definitive treatment of their hyperthyroidism in advance of pregnancy
- If Graves' disease is diagnosed during pregnancy the optimal treatment is with antithyroid drugs in the smallest dose necessary to achieve euthyroidism. Graves' disease often improves during pregnancy, so in some cases drug treatment can be withdrawn in the third trimester
- Graves' disease in the postpartum period can be treated with antithyroid drugs; breast feeding can be continued. Use of higher doses of antithyroid drugs (30 mg carbimazole, 150 mg propylthiouracil) requires monitoring of the baby's serum thyroid stimulating hormone and thyroxine concentrations.

Fetal and neonatal thyrotoxicosis

- Thyrotoxicosis in fetuses and neonates is rare but the risk in all patients who have Graves' disease should be communicated both to the mother and to the attending obstetrician and paediatrician
- The place of screening for thyroid stimulating hormone receptor antibody in the mother is not well established[23] but if performed functional assays should be used when available. Antibody testing early in the third trimester seems optimal. The earliest clinical sign of fetal thyrotoxicosis is fetal tachycardia[24] and if suspected cordocentesis should be considered
- Serum thyroid stimulating hormone and thyroxine concentrations should be measured in neonates whose mothers have or have ever had Graves' disease (audit)
- All children with neonatal thyrotoxicosis should have yearly neurological assessment until at least 6 years of age.[24]

Postpartum thyroiditis

- Symptoms of postpartum thyroiditis are usually mild. The syndrome must be differentiated from Graves' disease by detecting a low uptake of technetium-99m. Breast feeding need be discontinued for only a day after such an investigation.

Hyperthyroidism and the heart

- In patients with congestive cardiac failure and hyperthyroidism higher doses of radioiodine than normal should be given to control their thyroid status[25]
- Patients with atrial fibrillation due to hyperthyroidism may revert to sinus rhythm when treated, but this is less likely with age[26]
- There is no consensus yet on preventing the formation of emboli in patients with atrial fibrillation and hyperthyroidism. If structural abnormalities are detected on echocardiography or if there is hyperten-

Summary of good practice for purchasers

- Thyroid disorders are among the most prevalent of medical conditions and increase with age
- Screening the healthy adult population for thyroid dysfunction is unjustified
- The diagnosis of thyroid dysfunction must be confirmed biochemically
- Each district general hospital should have a specialist in thyroid disorders with access to an experienced thyroid surgeon and thyroid disease register
- Patients with hypothyroidism need referral only in certain circumstances
- Serum thyroid stimulating hormone concentration should be measured yearly to ensure compliance with the treatment of hypothyroidism
- All patients with hyperthyroidism should be referred to a specialist at diagnosis
- In Graves' disease carbimazole is the medical treatment of choice via either a titrating or block-replace regimen
- Radioiodine is indicated in most types of hyperthyroidism but must be given with caution in the presence of active Graves' ophthalmopathy
- Thyroid surgery by an experienced surgeon is an alternative method of treating hyperthyroid patients
- All patients treated with radioiodine or partial thyroidectomy should have a yearly check of thyroid function

sion or a history of thromboembolism warfarin or aspirin should be considered.[27] But even in the absence of these conditions many would advocate prophylaxis if not contraindicated.

Subclinical hyperthyroidism

- Subclinical hyperthyroidism is defined as a persistently suppressed serum thyroid stimulating hormone concentration with normal thyroxine and triiodothyronine concentrations in a patient who does not have symptoms
- There is as yet no consensus on whether such patients (not taking thyroxine) should receive antithyroid treatment
- It is debatable whether there is significant excess morbidity from subclinical hyperthyroidism, though a higher risk of atrial fibrillation in patients over 60[28] and decreased bone density in postmenopausal women[29] (unassociated as yet with an increase in fracture rates) have been recorded.

Conclusions

This report highlights several aspects in which further study would be useful to clarify some of the uncertainty in the management of hypothyroidism and hyperthyroidism. These include the relative costs of the options for treatment of hyperthyroidism, the cost effectiveness of a centralised computerised thyroid disease register, and whether patients with atrial fibrillation and hyperthyroidism should be anticoagulated. This consensus statement represent the collective opinion of the members of the working group, all of whom support this publication. The essential standards and associated audit measures for purchasers of health care and general practitioner fundholders are summarised in the box and can be used to ensure that a high standard of care is being achieved.

Contributors of background papers were: M C Sheppard and J Parle (role of screening, criteria for diagnosis, and referral patterns for hypothyroidism and hyperthyroidism); A D Toft (treatment of hypothyroidism); J A Franklyn (medical aspects of the treatment of hyperthyroidism); J H Lazarus, on behalf of the Radioiodine Audit Subcommittee, Royal College of Physicians Committee on Endocrinology and Diabetes, and Research Unit of the Royal College of Physicians of London (guidelines for the use of radioactive iodine in the management of hyperthyroidism (published by the Royal College of Physicians of London, November 1995 (ISBN 1 86016 023 9), and summarised in the *Journal of the Royal College of Physicians*)[15]; A P Weetman (treatment of special cases of hyperthyroidism); P Kendall-Taylor and G Proud (research evidence for effectiveness of surgery for hyperthyroidism); A McGregor (follow up and surveillance).

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1 Singer PA, Cooper DS, Levy EG, Ladenson PW, Braverman LE, Daniels G, *et al.* Treatment guidelines for patients with hyperthyroidism and hypothyroidism. *JAMA* 1995;273:808-12.
2 Tunbridge WMG, Evered DC, Hall R, Appleton D, Brewis M, Clark F, *et al.* The spectrum of thyroid disease in the community: the Whickham survey. *Clin Endocrinol (Oxf)* 1977;7:481-93.
3 Parle JV, Franklyn JA, Cross KW, Jones SC, Sheppard MC. Prevalence and follow-up of abnormal thyrotrophin (TSH) concentrations in the elderly in the United Kingdom. *Clin Endocrinol (Oxf)* 1991;34:77-83.
4 Alvarez-Marfany M, Roman SH, Drexler AJ, Robertson C, Stagnaro-Green A. Long-term prospective study of postpartum thyroid dysfunction in women with insulin dependent diabetes mellitus. *J Clin Endocrinol Metab* 1994;79:10-6.
5 Surks MI, Sievert R. Drugs and thyroid function. *N Engl J Med* 1995;333:1688-94.
6 Jones SJ, Hedley AJ, Curtis B, Allison SP, Woolfson AMJ, Steele R, *et al.* Do we need thyroid registers? A cost-effectiveness study. *Lancet* 1982;ii: 1229-32.
7 Franklyn JA, Betteridge J, Daykin J, Holder R, Oates GD, Parle JV, *et al.* Long-term thyroxine treatment and bone mineral density. *Lancet* 1992;340:9-13.
8 Kaplan MM. Monitoring thyroxine treatment during pregnancy. *Thyroid* 1992;2:147-52.
9 Vanderpump MPJ, Tunbridge WMG, French JM, Appleton D, Bates D, Clark F, *et al.* The incidence of thyroid disorders in the community—a twenty-year follow-up of the Whickham survey. *Clin Endocrinol (Oxf)* 1995;43:55-69.
10 Fung HYM, Kologlu M, Collison K, John R, Richards CJ, Hall R, *et al.* Postpartum thyroid dysfunction in Mid Glamorgan. *BMJ* 1988;296:241-4.
11 Martinez-Friar ML, Cereijo A, Rodriguez Pinilla E, Urioste M. Methimazole in animal feed and congenital aplasia cutis. *Lancet* 1992;339:742-3.
12 Momotani N, Yamashita R, Yoshimoto M, Noh J, Ishikawa N, Ito K. Recovery from fetal hypothyroidism: evidence for the safety of breast-feeding while taking propylthiouracil. *Clin Endocrinol (Oxf)* 1989;31:591-5.

13 Reinwein D, Benker G, Lazarus JH, Alexander WD, European Multicenter Study Group on Antithyroid Drug Treatment. A prospective randomized trial of antithyroid drug dose in Graves' disease therapy. *J Clin Endocrinol Metab* 1993;**76**:1516-21.
14 Weetman AP, Pickerill AP, Watson P, Chatterjee VK, Edwards OM. Treatment of Graves' disease with the block-replace regimen of antithyroid drugs: the effect of treatment duration and immunogenetic susceptibility on relapse. *Q J Med* 1994;**87**:337-41.
15 Lazarus JH, on behalf of the Radioiodine Audit Subcommittee of the Royal College of Physicians Committee on Endocrinology and Diabetes and the Research Unit of the Royal College of Physicians. Guidelines for the use of radioactive iodine in the management of hyperthyroidism. *J R Coll Physicians Lond* 1995;**29**:464-9.
16 Franklyn JA, Daykin J, Drolc Z, Farmer M, Sheppard MC. Long-term follow-up of treatment of thyrotoxicosis by three different methods. *Clin Endocrinol (Oxf)* 1991;**34**:71-6.
17 Sugrue D, McEvoy M, Feely J, Drury MI. Hyperthyroidism in the land of Graves: results of treatment by surgery, radioiodine and carbimazole in 837 cases. *Q J Med* 1980;**193**:51-61.
18 Cusick EL, Krukowski ZH, Matheson NA. Outcome of surgery for Graves' disease reexamined. *Br J Surg* 1987;**74**:780-3.
19 Thjodleifsson B, Hedley AJ, Donald D, Chesters MI, Kjeld M, Swanson J, *et al.* Outcome of subtotal thyroidectomy for thyrotoxicosis in Iceland and north east Scotland. *Clin Endocrinol (Oxf)* 1977;**7**:367-76.
20 Falk SA. The management of hyperthyroidism. A surgeon's perspective. *Otolarymgol Clin North Am* 1990;**23**:361-80.
21 Neis C, Sitter H, Zielke H, Bandorski T, Menze J, Ehlenz K, *et al.* Parathyroid function following ligation of the inferior thyroid arteries during subtotal thyroidectomy. *Br J Surg* 1994;**81**:1757-9.
22 Burrow GN. Thyroid function and hyperfunction during gestation. *Endocr Rev* 1993;**14**:194-202.
23 McKenzie JM, Zakarija M. The clinical use of thyrotropin receptor antibody measurements. *J Clin Endocrinol Metab* 1989;**69**:1093-6.
24 Hollingsworth DR. Neonatal hyperthyroidism. *Pediatr Adolesc Endocrinol* 1985;**14**:210-22.
25 Scott GR, Forfar JC, Toft AD. Graves' disease and atrial fibrillation: the case for even higher doses of therapeutic iodine-131. *BMJ* 1984;**289**:399-400.
26 Nakazawa HK, Sakurai K, Hamada N, Momotani N, Ito K. Management of atrial fibrillation in the post-thyrotoxic state. *Am J Med* 1982;**72**:903-6.
27 White HD. Aspirin or warfarin for non-rheumatic atrial fibrillation? *Lancet* 1994;**343**:683.
28 Sawin CT, Geller A, Wolf PA, Belanger AJ, Baker E, Bacharach P, *et al.* Low serum thyrotropin concentrations as a risk factor for atrial fibrillation in older persons. *N Engl J Med* 1994;**331**:1249-52.
29 Faber J, Galloe AM. Changes in bone mass during prolonged subclinical hyperthyroidism due to L-thyroxine treatment: a meta-analysis. *Eur J Endocrinol* 1994;**130**:350-6.

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Training for excellence in the inner city: an interview with Richard Savage and Clare Vaughan

Douglas Carnall

See pp 555, 565

Recruitment to general practice is at its lowest level for 30 years, and many vocational training schemes report difficulty in attracting new trainees. Spurred on by the aging population of south London, and with the advantage of £1.3m of development money resulting from the Tomlinson report, the south London organisation of vocational training schemes (SLOVTS) has perhaps been able to cope better than most. Its chair, Richard Savage, a general practitioner and course organiser, and Clare Vaughan, an assistant adviser, have devised and implemented many innovative training posts for general practice over the past two years, and their approach seems to be bearing fruit: most of the doctors who have finished the training scheme are now entering practice in south London. They talked to Douglas Carnall about the causes of the crisis and the measures they have implemented to counter it. Clare Vaughan died in the week following the interview (see obituary, p 555).

DC: Much has been made recently of the fact that recruitment to general practice is at its lowest level in recent times. What are your views on why that is?

RS: It's hard to know where to begin. I wonder whether medical schools have the correct process to recruit students with the qualities that general practitioners need to have. At my first lecture at medical school, the first lecturer to say anything to us said, "You're extremely privileged to attend this medical school because 70% of you are going to be hospital consultants," and I think this ethos still exists.

Perhaps we should scrap the second MB and substitute parts of the second and third years of the British School of Osteopathy's course, which is absolutely brilliant. It's all about people—what people think about disease, how they respond to it when they get it, and what it means to them. I think that science is wonderful and exciting, but it's not the whole answer.

One could go even further back and look at the way that the concept of a career in medicine is sold to children doing their A levels and at the way that the media shape public opinion about the profession. The negative presentation of the lot of general practitioners in the medical press has not helped our cause, but it is true that general practice has become a much more complex and bureaucratic pastime, which is a fact that young doctors are picking up on now. At the same time the changes that are occurring in hospital medicine have led to greater certainty of outcome if they choose to become specialists.

CV: Besides which, medical education still hasn't really cracked the problem of giving people life skills and management skills so that they can look after themselves. New entrants to our scheme are woefully ill prepared in these areas. The 1990 contract has also undoubtedly had an effect. One of the reasons why I became a general practitioner was to be able to make choices and to be able to imprint my personality on the way I worked. The autonomy and freedom that went with general practice is something we hold very dear, and the past six years have imposed values that we've never bought. A lot of stuff has come our way with no negotiation and has reduced our sense of being in control of our professional lives, which is deeply demoralising. That demoralisation shows itself in being stubborn and wilful and resistant to change and not getting on with the jobs that can be done.

RS: The past six years has shown how incredibly efficient the old system was if it was done properly and how much it benefitted the patients. Increasingly, people who are ever more cast adrift in society come to their general practitioner, who, without being too judgmental or directive, gives them some sort of sense of where they're at. That's an incredibly important part of our job, an incredibly rewarding part of our job, and it's sort of got lost.

CV: We have a lot of work to make up in managing patients' expectations, but the bedrocks of primary care—the variety, the patients, the stories, the companionship, the local contacts with hospital colleagues—are all still there. It's too easy just to see the bits that put you off in the short term when you're making a decision as a junior doctor.

DC: So let's move on to the junior doctors that you're training. Have the south London vocational training schemes seen number of entrants falling off in the same way that seems to be happening nationally?

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