

Putting NICE guidance into practice

Resource impact report: Thyroid disease: assessment and management (NG145)

Published: November 2019

Summary

This report focuses on the recommendations from NICE's guideline on [Thyroid disease: assessment and management](#) that we think will have the greatest resource impact nationally (for England), and will potentially generate the biggest savings. They are:

- offer radioactive iodine as first-line treatment for adults with Graves' disease, unless antithyroid drugs are likely to achieve remission, or it is unsuitable (recommendation 1.6.10)
- offer a choice of antithyroid drugs or radioactive iodine as a first line definitive treatment for adults with Graves' disease if antithyroid drugs are likely to achieve remission (recommendation 1.6.11)
- do not offer testing for thyroid dysfunction solely because a person has type 2 diabetes (recommendation 1.2.7).

Financial impact

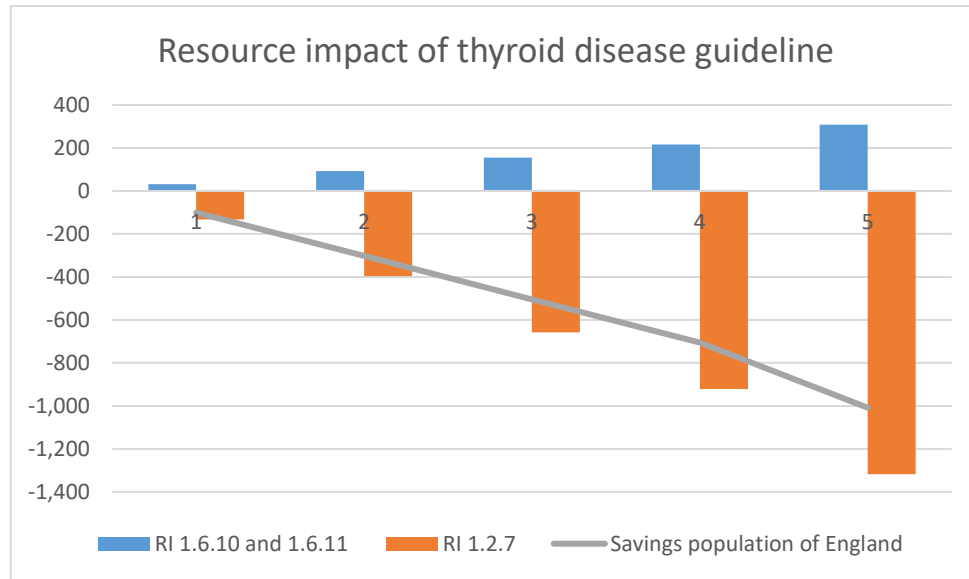
The estimated financial impact of implementing this guideline for the population of England in the next 5 years is a saving of around £0.1 million in 2019/20 rising to a saving of around £1.0 million per annum from 2023/24 as set out in table 1 and figure 1 below. The savings result from:

- a reduction in the use of antithyroid drugs
- a reduction in the number of thyroid function tests for people with type 2 diabetes.

Table 1 Estimated budget impact of implementing the guideline

	Current practice	2019/20	2020/21	2021/22	2022/23	2023/24
Implementation rate of guideline		10%	30%	50%	70%	100%
Recommendation 1.6.10 and 1.6.11						
Antithyroid drugs – Primary care (£000)	6,438	6,220	5,785	5,349	4,914	4,261
Radioactive iodine – Secondary care (£000)	2,378	2,627	3,124	3,622	4,119	4,865
Surgery – Secondary care (£000)	4,364	4,364	4,364	4,364	4,364	4,364
Cost of rec 1.6.10 and 1.6.11 (£000)	13,181	13,212	13,273	13,335	13,397	13,490
Recommendation 1.2.7						
TSH ¹ – partially cash releasing (£000)	576	533	446	360	273	144
TSH ¹ and FT4 ² – partially cash releasing (£000)	1,181	1,092	915	738	561	295
Cost of rec 1.2.7 (£000)	1,757	1,625	1,361	1,098	834	439
Total cost (£000)	14,937	14,836	14,635	14,433	14,231	13,929
Savings population of England (£000)	0	-101	-303	-504	-706	-1,008
Savings per 100,000 population (£000)	0	0	-1	-1	-1	-2
1 TSH is Thyroid stimulating hormone						
2 FT4 is free thyroxine						

Figure 1 Resource impact of NICE thyroid disease guideline



1 Introduction

- 1.1 The guideline offers best practice advice on the assessment and management of thyroid disease.
- 1.2 This report discusses the resource impact of implementing our guideline on thyroid disease: assessment and management in England. It aims to help organisations plan for the financial implications of implementing this NICE guideline.
- 1.3 A resource impact template accompanies this report to help with assessing the resource impact at a local level in England, Wales or Northern Ireland.
- 1.4 We have considered direct costs and savings to the NHS (and local authorities if applicable) and not those for the individual, the private sector or the not-for-profit sector.
- 1.5 Management of thyroid disease services are part of endocrinology services which are commissioned by clinical commissioning groups. Providers are NHS hospitals and primary care services.

2 Background

- 2.1 Thyroid disease comprises thyroid enlargement and/or thyroid hormonal dysfunction. Conditions causing abnormal thyroid function can be broadly divided into those that result in thyroid gland underactivity (hypothyroidism) or overactivity (hyperthyroidism).
- 2.2 Long-term consequences of hyperthyroidism include increased cardiovascular morbidity and mortality and bone-related complications including osteoporosis.
- 2.3 There are currently no standardised diagnostic or referral criteria in the UK to guide decision-making in primary care for people with structural thyroid abnormalities or enlargement. In secondary care

there is significant variation in the types of diagnostic tests and imaging used, as well as in surgical and non-surgical management and follow-up protocols.

3 Significant resource impact recommendations

There are 3 guideline recommendations that are likely to lead to a significant resource impact when implemented. Two of these are considered together in section 3.1, the third is considered separately in section 3.2.

- 3.1 Offer radioactive iodine as first-line definitive treatment for adults with Graves' disease, unless antithyroid drugs are likely to achieve remission (see recommendation 1.6.11), or it is unsuitable (for example, there are concerns about compression, malignancy is suspected, they are pregnant or trying to become pregnant or father a child within the next 4 to 6 months, or they have active thyroid eye disease). (recommendation 1.6.10)**

Offer a choice of antithyroid drugs (a 12- to 18-month course) or radioactive iodine as first-line definitive treatment for adults with Graves' disease if antithyroid drugs are likely to achieve remission (for example, mild and uncomplicated Graves' disease). (recommendation 1.6.11)

Background

- 3.1.1** Radioactive iodine produces better long-term outcomes than a course of antithyroid drugs in terms of thyroid status, but it is not suitable for all people, including those with thyroid eye disease.
- 3.1.2** Following implementation of the guideline it is anticipated that there will be an increase in first-line treatment with radioactive iodine. This is expected to result in a corresponding reduction in the use of antithyroid drugs.

- 3.1.3 It is anticipated that there will be no change to the amount of thyroid surgery as a result of radioactive iodine being recommended as first-line treatment.

Assumptions made

- 3.1.4 The incidence of hyperthyroidism is around 0.051% of the adult population, this is equivalent to around 22,300 people annually in England ([Garmendia Madraiaga A et al, 2014](#)).
- 3.1.5 Based on expert clinical opinion, of those people who have hyperthyroidism, around 75% have Graves' disease, this is equivalent to around 16,700 people.
- 3.1.6 Based on expert clinical opinion there are currently 68% of people with Graves' disease treated with antithyroid drugs, 22% are treated with radioactive iodine and 10% are treated with surgery.
- 3.1.7 Expert clinical opinion is that 70% of people who are having antithyroid drugs will have a titration regime, and 30% will have antithyroid drug block and replace regime.
- 3.1.8 Everyone is assumed to be treated for 18 months in total. Antithyroid drug titration consists of 6 months treatment with 30 mg of carbimazole followed by 12 months treatment with 5-10 mg of carbimazole.
- Treatment with an antithyroid drug block and replace regime consists of 40 mg of carbimazole for 18 months and 50-100 mcg of levothyroxine for 16 months within the 18-month period.
- 3.1.9 Expert clinical opinion is that in future practice, 45% of people will be treated with antithyroid drugs, 45% will be treated with radioactive iodine and 10% of people will continue to be treated with surgery. This is summarised in table 2.

Table 2 Current and future practice for people with Graves' disease.

Population	Current practice		Future practice	
	%	Number	%	Number
People who have Graves' disease				
People treated with antithyroid drugs	68	11,400	45	7,500
People treated with radioactive iodine	22	3,700	45	7,500
People treated with surgery	10	1,700	10	1,700
Total	100	16,700	100	16,700

Numbers rounded to nearest 100

Costs

3.1.10 Table 3 summarises the NHS costs of the 3 treatment options.

Table 3 Cost of treatment options per patient per year.

Treatments	Cost (£)
People treated with antithyroid drugs (titration 1 st year) - carbimazole 30mg per day for 6 months followed by carbimazole 5-10mg per day for 6 months (eMIT national database, 2019).	341
People treated with antithyroid drugs (titration 2 nd year) - carbimazole 5-10mg per day for 6 months (eMIT national database, 2019).	83
People treated with antithyroid drugs (block and replace 1 st year) - carbimazole 40mg per day for 12 months and levothyroxine 50-100mcg for 10 months (eMIT national database, 2019).	597
People treated with antithyroid drugs (block and replace 2 nd year) - carbimazole 40mg per day for 6 months and levothyroxine 50-100mcg for 6 months (eMIT national database, 2019).	300
People treated with radioactive iodine - RN51Z - oral delivery of radiotherapy for thyroid ablation (National tariff 2019/20).	646
People treated with surgery - average cost of thyroid procedures KA09C-E (National tariff 2019/20, weighted by 2017/18 reference costs)	2,608

3.1.11 The costs of dispensing drugs and any potential efficiency gains for providers as a result of reduced prescribing of antithyroid drugs, are not included in this report or the associated template.

Resource impact

3.1.12 The resource impact of implementing recommendations 1.6.10 and 1.6.11 is summarised in table 4.

Table 4 Estimated annual cost of recommendation 1.6.10 and 1.6.11 for the population of England

	Current practice	2019/20	2020/21	2021/22	2022/23	2023/24
Implementation rate		10%	30%	50%	70%	100%
Antithyroid drugs						
Number of people	22,760	21,990	20,451	18,911	17,371	15,062
Cost (£000s)	6,438	6,220	5,785	5,349	4,914	4,261
Radioactive iodine						
Number of people	3,682	4,067	4,837	5,606	6,376	7,531
Cost (£000s)	2,378	2,627	3,124	3,622	4,119	4,865
Surgery						
Number of people	1,674	1,674	1,674	1,674	1,674	1,674
Cost (£000s)	4,364	4,364	4,364	4,364	4,364	4,364
Total cost (£000s)						
	13,181	13,212	13,273	13,335	13,397	13,490
Resource impact of recommendation 1.6.10 and 1.6.11 for the population of England (£000s)						
	0	31	93	154	216	309

Benefits and savings

- 3.1.13 People who have had treatment with antithyroid drugs may be more likely to relapse than if they had been treated with radioactive iodine or surgery. People who relapse following antithyroid drugs may consider treatment with either radioactive iodine or surgery. Treatment with radioactive iodine is considered definitive and so prevents almost all relapses and any costs that a relapse would generate. The cost of treatment for relapse is the same as for first-line treatment.
- 3.1.14 A reduction in antithyroid drug prescribing will be a saving for primary care providers and clinical commissioning groups.
- 3.1.15 Additional costs for changing practice to use radioactive iodine more often will impact secondary care and clinical commissioning

groups. It is currently assumed that there is no change in the number of surgeries.

Other considerations

- 3.1.16 Underactive thyroid, which needs monitoring and treatment, is common after radioactive iodine or surgery for overactive thyroid, but highly unlikely after antithyroid drug treatment. Therefore, there may be additional monitoring and treatment costs associated with increased radioiodine treatment.
- 3.1.17 The guideline committee do not expect a significant resource impact as a result of the guideline recommendations for surgery. This is because they largely reflect current practice. Therefore, any associated costs such as follow-up appointments or costs relating to rehabilitation have not been included in the resource impact template.
- 3.2 **Do not offer testing for thyroid dysfunction solely because an adult, child or young person has type 2 diabetes (recommendation 1.2.7)**

Background

- 3.2.1 The committee noted that thyroid function tests are currently being performed as part of routine clinical assessments in some conditions, such as type 2 diabetes.

Assumptions

- 3.2.2 There are around 2.7 million adults ([QOF 2017/18](#)) and around 600 children and young people ([NICE CKS](#)) in England who have type 2 diabetes.
- 3.2.3 Expert clinical opinion is that currently 10% of adults with type 2 diabetes (around 270,000 people) will be tested with thyroid stimulating hormone (TSH), 10% (around 270,000 people) will be

tested with both TSH and free thyroxine (FT4) and 80% (around 2.1 million people) will not receive any testing for thyroid dysfunction.

- 3.2.4 Expert clinical opinion is that in future practice 2.5% of adults with type 2 diabetes (around 67,000 people) will be tested with TSH, 2.5% (around 67,000 people) will be tested with both TSH and FT4 and 95% (around 2.5 million people) will not receive any testing.

Costs

- 3.2.5 Table 5 summarises the NHS costs of the 3 treatment options.

Table 5 Costs of thyroid function tests

Treatments	£
TSH testing	2.15
TSH and FT4 testing	4.41
Costs are based on information provided by committee members for the health economic evaluation.	

- 3.2.6 The costs of testing are based on the costs to providers for the tests. This recommendation is not anticipated to change the tariff that commissioners pay for this activity. Therefore, any savings are not expected to be cash releasing for commissioners, but providers will reduce their test costs.

Resource impact

- 3.2.7 The resource impact of implementing recommendation 1.2.7 is summarised in table 6.

Table 6 Resource impact of recommendation 1.2.7

	Current practice	2019/20	2020/21	2021/22	2022/23	2023/24
Implementation rate		10%	30%	50%	70%	100%
TSH testing only						
Number of people	267,765	247,683	207,518	167,353	127,188	66,941
Cost (£000)	576	533	446	360	273	144
TSH and FT4 testing						
Number of people	267,765	247,683	207,518	167,353	127,188	66,941
Cost (£000)	1,181	1,092	915	738	561	295
No testing						
Number of people	2,142,121	2,182,286	2,262,615	2,342,945	2,423,274	2,543,769
Cost (£000)	0	0	0	0	0	0
Total cost (£000)						
	1,757	1,625	1,361	1,098	834	439
Resource impact of recommendation 1.2.7 for the population of England (£000s)						
	0	-132	-395	-659	-922	-1,317

Benefits and savings

3.2.8 There will be a reduction in testing for thyroid dysfunction solely because of type 2 diabetes where there is not a clinical need to carry out the test.

Other considerations

3.2.9 The savings generated from this recommendation are not likely to be cash releasing for commissioners as it will not affect the tariff used. It is expected that this recommendation will benefit providers as it will reduce the number of tests that are performed.

4 Resource impact over time

4.1 The estimated annual saving of implementing this guideline, based on the uptake in the resource impact assumptions is shown in table 7.

Table 7 Savings from implementing the guideline using NICE assumptions

	Current practice	2019/20	2020/21	2021/22	2022/23	2023/24
Implementation rate of guideline		10%	30%	50%	70%	100%
Recommendation 1.6.10 and 1.6.11						
Antithyroid drugs – CCGs (£000)	6,438	6,220	5,785	5,349	4,914	4,261
Radioactive iodine - CCGs (£000)	2,378	2,627	3,124	3,622	4,119	4,865
Surgery – CCGs (£000)	4,364	4,364	4,364	4,364	4,364	4,364
Cost of rec 1.6.10 and 1.6.11 (£000)	13,181	13,212	13,273	13,335	13,397	13,490
Recommendation 1.2.7						
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Total cost (£000)	14,937	14,836	14,635	14,433	14,231	13,929
Savings population of England (£000)	0	-101	-303	-504	-706	-1,008
Savings per 100,000 population (£000)	0	0	-1	-1	-1	-2

5 Implications for commissioners and providers

5.1 The treatment of thyroid disease falls under programme budgeting category 04B Endocrine.

- 5.2 It is expected that there will be an increase in outpatient appointments for radioactive iodine treatment and a reduction in the costs of drug treatment, as well as a decrease in the volume of tests carried out by providers. This has been modelled in table 7.

6 Assumptions made

- 6.1 If a national tariff price or indicative price exists for an activity, this has been used as the unit cost. The resource impact template can be used to amend unit costs to account for any local market forces factor.
- 6.2 Using these prices ensures that the costs in the report are the cost to the clinical commissioning groups of commissioning predicted changes in activity at the tariff price. However, these costs may not represent the actual cost to individual trusts of delivering the activity.

7 Other considerations

- 7.1 Consider measuring thyroid peroxidase antibodies (TPOAbs) for adults with TSH levels above the reference range, but do not repeat TPOAbs testing (recommendation 1.3.1).

Based on information from NHS hospital trusts, the numbers of repeat tests are not expected to be significant at a national level. By avoiding repeat testing, savings of around £840,000 for the population of England or £1,500 per 100,000 population may be expected.

- 7.2 Differentiate between thyrotoxicosis with hyperthyroidism (for example, Graves' disease or toxic nodular disease) and thyrotoxicosis without hyperthyroidism (for example, transient thyroiditis) in adults by:
- measuring TSH receptor antibodies (TRAbs) to confirm Graves' disease

- considering technetium scanning if TRAbs are negative (recommendation 1.6.1).

It is assumed that there may be a small increase in TRAb testing for people with thyrotoxicosis. This is not expected to result in a significant resource impact, which is estimated to be around £370,000 for the population of England or £670 per 100,000 population. This is because the test is low cost and is widely available.

- 7.3 Only consider ultrasound for adults with thyrotoxicosis if they have a palpable thyroid nodule (recommendation 1.6.2).

Although thyroid ultrasound has a limited role in the investigation of suspected Graves' disease, many healthcare professionals offer this investigation. This recommendation will discourage healthcare professionals from using thyroid ultrasound routinely in the investigation of suspected Graves' disease. This is expected to lead to a small cost saving.

- 7.4 Do not monitor full blood count and liver function for adults, children and young people taking antithyroid drugs for hyperthyroidism unless there is a clinical suspicion of agranulocytosis or liver dysfunction (recommendation 1.7.10).

No evidence was found to support a strategy of routinely monitoring full blood count and liver function tests. It is expected that this recommendation will also lead to a small cost saving.

8 Sensitivity analysis

- 8.1 There are some assumptions in the model for which no empirical evidence exists, so we cannot be as certain about them. Appropriate minimum and maximum values of variables were used in the sensitivity analysis to assess which variables have the

biggest impact on the net cost or saving. This enables users to identify the significant cost drivers.

Appendix A is a table listing all variables modified. The key conclusions are discussed below.

- 8.2 Varying the number of people with type 2 diabetes who will not be tested for thyroid function in future practice from 92.5% to 97.5% leads to an estimated saving of between £0.8 million and £1.2 million for England.
- 8.3 Varying the number of people with type 2 diabetes who are currently not tested for thyroid function from 70% to 90% leads to an estimated saving of between £1.9 million and £0.1 million for England.
- 8.4 Varying the number of people in current practice who have antithyroid drugs on a titration strategy from 60% to 80% leads to an estimated resource impact of between £1.5 million and £0.5 million for England.
- 8.5 Varying the number of people in future practice who have antithyroid drugs on a titration strategy from 60% to 80% leads to an estimated resource impact of between £0.7 million and £1.4 million for England.

Appendix A. Results of sensitivity analysis

				Recurrent resource impact			Change (£000s)	Sensitivity ratio
	Baseline value	Minimum value	Maximum value	Baseline resource impact (£000s)	Minimum resource impact (£000s)	Maximum resource impact (£000s)		
Current split of antithyroid drugs between titration and block and replace antithyroid drug strategies	70.0%	60.0%	80.0%	-1,008	-471	-1,546	-1,075	0.45
Future split of antithyroid drugs between titration and block and replace antithyroid drug strategies	70.0%	60.0%	80.0%	-1,008	-653	-1,364	-712	0.30
Future uptake of radioactive iodine, with balancing adjustments made to the antithyroid drugs	45.0%	40.0%	50.0%	-1,008	-941	-1,076	-134	0.07
Future uptake of surgery, with balancing adjustments made to the radioactive iodine	10.0%	5.0%	15.0%	-1,008	-2,650	633	3,283	0.39
Current uptake of no testing for thyroid function people with type 2 diabetes, adjusted equally between the other 2 testing strategies	80.0%	70.0%	90.0%	-1,008	-1,887	-130	1,757	0.84
Future uptake of no testing for thyroid function people with type 2 diabetes, adjusted equally between the other 2 testing strategies	95.0%	92.5%	97.5%	-1,008	-789	-1,228	-439	1.00

About this resource impact report

This resource impact report accompanies the NICE guideline [Thyroid disease: assessment and management](#) and should be read in conjunction with it. See [terms and conditions](#) on the NICE website.

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