

# Evaluating the effectiveness of the new referral pro forma for Short Synacthen Testing



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## Background

The Short Synacthen Test (SST) allows assessment of the hypothalamic - pituitary-adrenal axis to diagnose or exclude adrenal insufficiency. Serum ACTH levels can then be measured to help differentiate between primary and secondary adrenal insufficiency.

A previous audit at the City Hospital Endocrine Centre found that 9% of SSTs were inappropriately requested as either no reason was provided for the test or the clinical history did not support the need for a SST. Furthermore, 70% of initial SSTs performed were found to be normal<sup>(1)</sup>. Although a relatively safe investigation, rare complications of systemic hypersensitivity reactions have been reported particularly in children with a history of allergic diseases. There is also a cost benefit of reducing the number of unnecessary SSTs performed.

In order to minimise unnecessary SSTs a new pro forma to refer patients was produced. As part of the referral system at least one of the following four referral categories; **symptoms** (fatigue, weight loss, light-headedness or symptoms of recent acute illness), **medications** (regular or recent use of exogenous steroids), **previous diagnoses** (autoimmune disease, pituitary pathology or chronic disease) and **physical findings** (hypotension, pigmentation, vitiligo or hyponatraemia) had to be satisfied for the patient to be eligible.

The new pro forma aimed to streamline and make the referral system more effective.

The SST involves intramuscular administration of tetracosactin (Synthetic ACTH) followed by measurement of serum cortisol at 30 minutes. If clinically appropriate, then serum cortisol measurements at 60 minutes can be specifically requested by the endocrinologist, although this is rarely done. The conventional 30 minute SST potentially over diagnoses adrenal insufficiency in patients who may have a delayed response but otherwise an adequate adrenal reserve.

## Aims

To evaluate the use of the new SST pro forma at the Birmingham Endocrine Centre to see if there has been an improvement in the referral system. In particular:

- 1) Evaluate if there has been a reduction in the discrepancy between clinical suspicion of adrenal insufficiency and actual adrenal function.
- 2) Evaluate if there has been a reduction in the number of inappropriate referrals made.
- 3) Evaluate if there is any value in measuring cortisol levels at 0 (baseline), 30 and 60 minutes for all patients.

## Methods

We collected all referrals to the endocrine department made using the pro form for a 3 month period between September 2014 and November 2014. Relevant patient information was obtained from the pro forma, patient notes and serum cortisol results were followed up on a database.

A SST was deemed appropriate if at least one of the following four categories; symptoms, medications, previous diagnoses and physical findings for the patient were satisfied.

Cortisol levels were measured at 0 (baseline), 30 and 60 minutes for all patients and a test was classified as normal if the cortisol increased by >200nmol/L and a peak level >550nmol/L at 60 minutes (Figure 1).

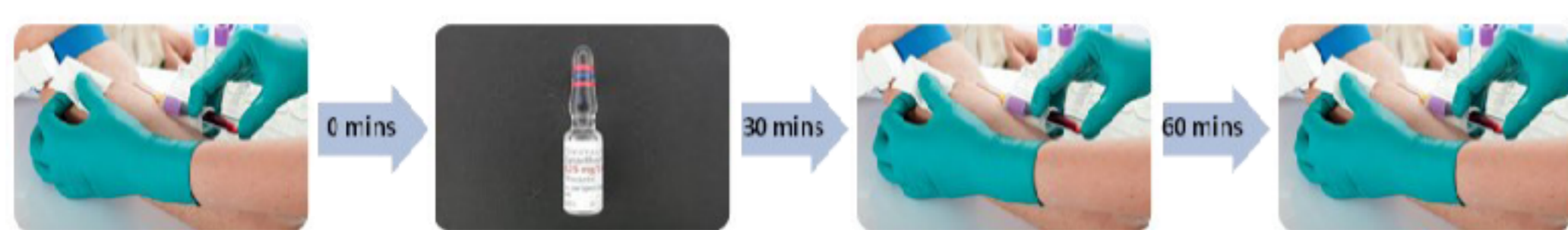


Figure 1—The Short Synacthen Test Protocol

## Results

27 SST pro formas were submitted during the study period and all 27 SSTs carried out satisfied the study criteria and are therefore included in the analysis. 74% of the patients were female with a mean age of 41 years and 26% were male with a mean age of 41 years. The most frequent ethnic group was White (15) followed by Asian (7), Black (3) and other ethnic group (2) (Figure 2).

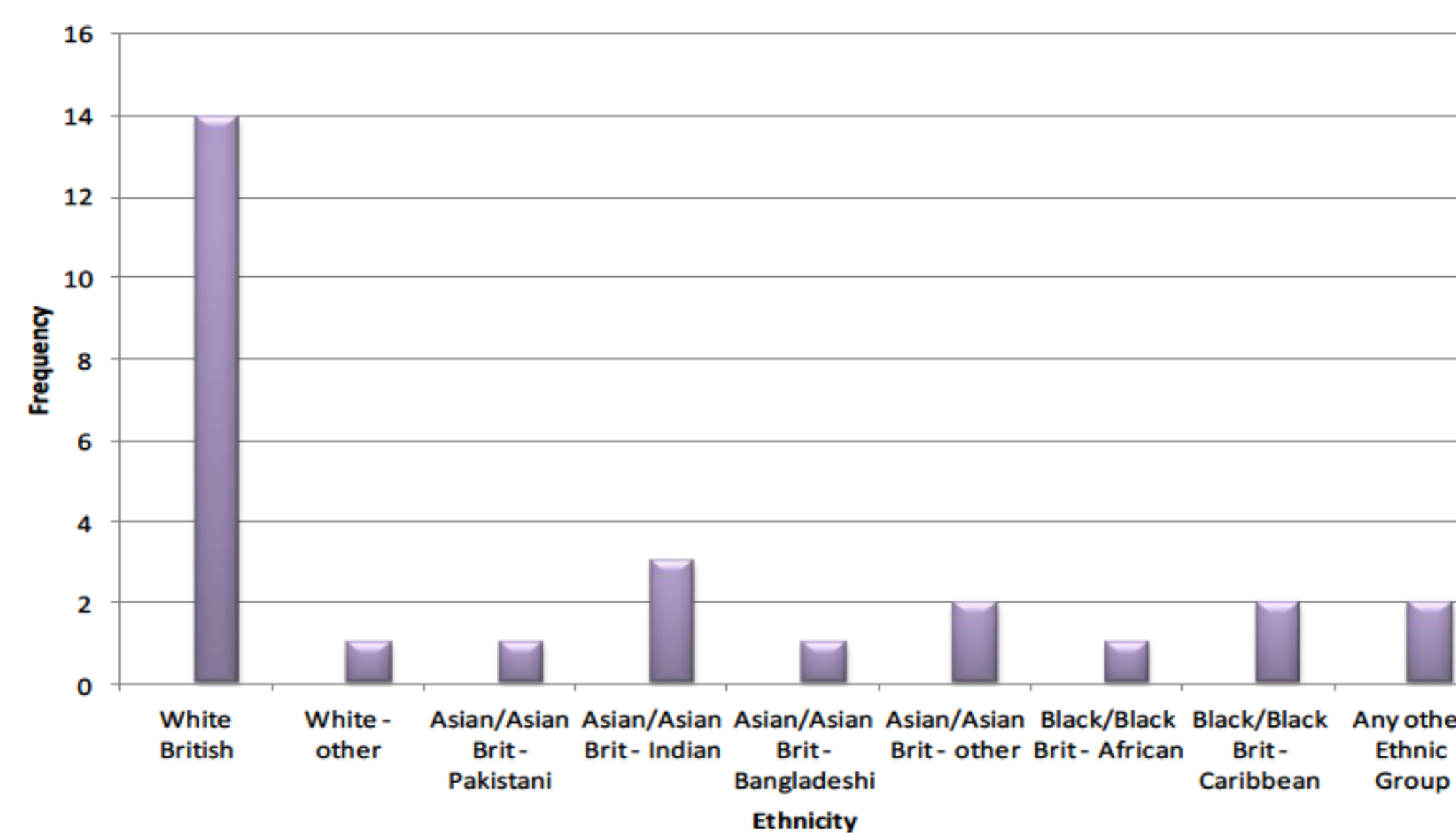


Figure 2 - Ethnic frequency of patients referred for an SST

All 27 patients met at least one referral criteria and therefore all patients were deemed to be referred appropriately. The most common referral criteria was a 'previous diagnosis' (13 patients) followed by 'symptoms' (12), 'physical findings' (7) and finally 'medications' (6) (Figure 3). 7 patients were referred satisfying only the symptoms criteria and 7/7 (100%) of these patients went on to have a normal result. 5 patients satisfied the symptoms criteria and at least 1 other criteria and 5/5 (100%) of these patients went on to have an abnormal result.

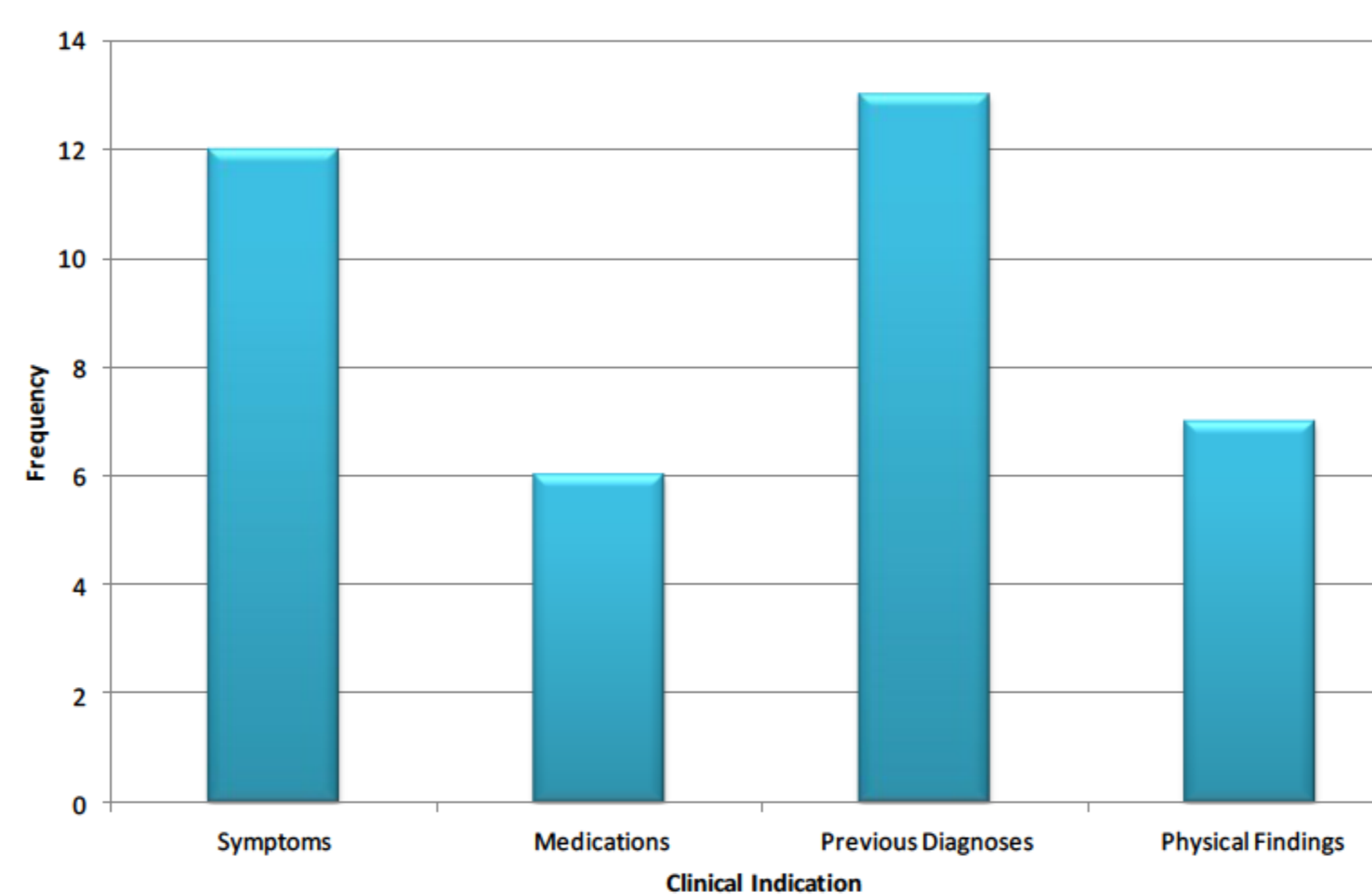


Figure 3 - Frequency of referral criteria categories for SST referrals

70% (19 patients) satisfied 1 referral criteria, 19% (5) satisfied 2 and 11% (3) satisfied 3 criteria. 44% (12/27) of the patients referred had an abnormal SST result. All patients (3/3) referred having satisfied 3 criteria had an abnormal result. 80% (4/5) referred having satisfied 2 criteria and finally 26% (5/19) referred due to satisfying only 1 criteria had abnormal SST results (Figure 4).

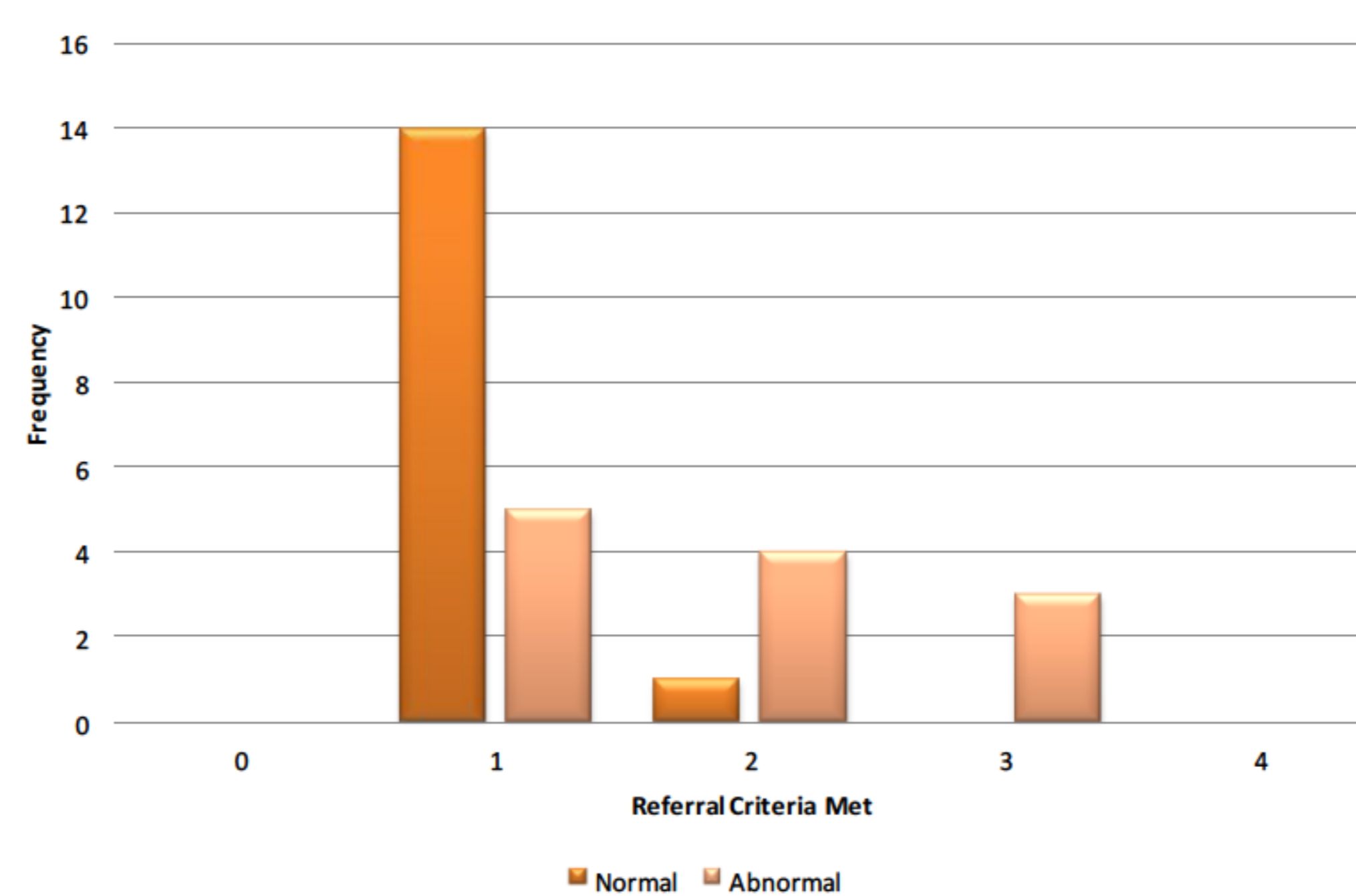


Figure 4 - Frequency of normal/abnormal results and number of referral criteria met

Measurement of cortisol levels at 30 minutes identified 63% (17/27) of patients as having abnormal results. Measurement at 60 minutes defined 44% (12/27) of patients as having an abnormal result (Figure 5). 5 patients who had an abnormal result at 30 minutes went on to have a normal SST result at 60 minutes. All 12 patients who had an insufficient result at 60 minutes were also insufficient at 30 minutes.

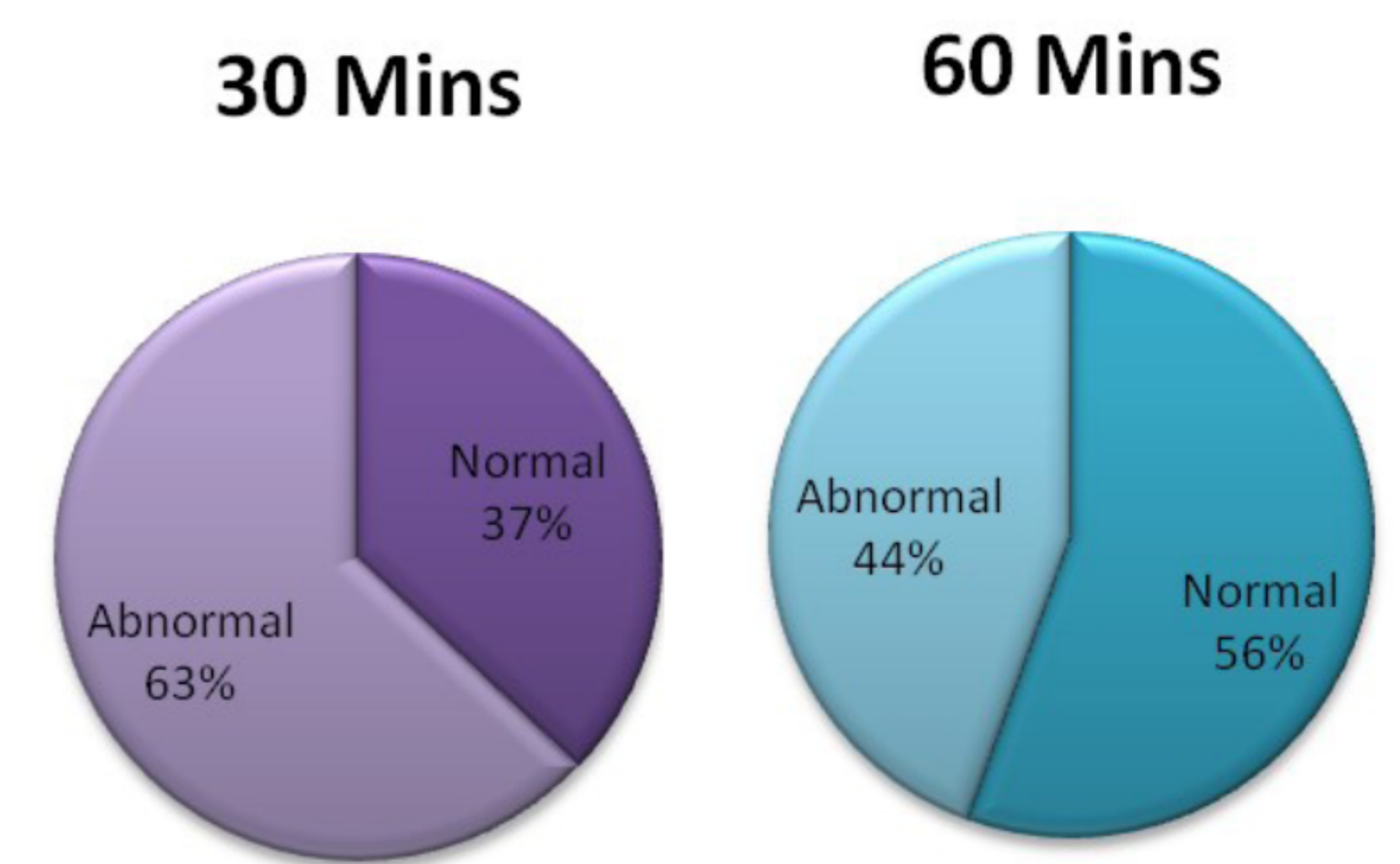


Figure 5 - SST results at 30 and 60 minutes

## Discussion

The new form has increased appropriateness of referral to 100% from previously being 91% appropriate referral in the department. This was one of the aims of the new referral system. It is possible that the simple design that incorporates the key clinical features of adrenal insufficiency has made it easier for medical staff to assess the need for a SST.

As a result of increased appropriateness in referring, this protocol aimed to reduce the discrepancy between clinical suspicion of adrenal insufficiency and actual adrenal function. The requirement to satisfy one of four criteria has reduced the discrepancy and increased the percentage of abnormal tests from 30% to 68% at 30 minutes and to 44% at 60 minutes. Therefore this suggests this is an improved and more effective method to select patients for an SST.

Carrying out this investigation only when necessary means patients are not being put under risk of side effects which although are rare but can be serious. This test can be inconvenient as patients are often required to stop contraceptive pills and hormone replacement therapy up to 6 weeks in advance of the test.

None of the 7 patients who qualified for this test based on meeting only the symptoms criteria had an abnormal result. In contrast, the 5 patients who had symptoms and met at least one other criteria category all had an abnormal result. This suggests that it may be possible to further improve the discrepancy by changing the criteria to only test patients with symptoms if they meet at least one of the other three criteria categories. The symptoms criteria category is vague which reflects the non-specific symptoms that are associated with adrenal insufficiency.

Furthermore, this audit has shown that it may be beneficial to routinely measure serum cortisol levels at 60 minutes as 5 patients who had abnormal results at 30 minutes went on to reach normal serum cortisol levels at 60 minutes. These findings were supported by a larger retrospective study which showed that up to 11% of patients were over diagnosed based on 30 minute results<sup>(2)</sup>. Over diagnosis of adrenal insufficiency leads to further clinical testing and potentially unnecessary treatment. The further testing and treatment also has financial implications and therefore should be avoided unless necessary.

## Conclusion

The new referral system has streamlined the process making it more effective in terms of appropriateness for referrals and discrepancy between clinical suspicion and actual adrenal function. Further changes to incorporate the findings regarding only symptomatic referral and normal SSTs will further improve the process. Finally, routine serum cortisol levels at 60 minutes for all patients could help prevent over diagnosis with direct benefits for patients and may be cost effective for the NHS. We will re-audit the protocol again in the future to evaluate the further changes.

## Recommendations

- 1) Symptomatic patients have to satisfy at least 1 other referral criteria to be eligible for a SST test.
- 2) Routinely measure 60 minute cortisol levels in all patients.

## References

- 1) Focault DR, Guthrie S, De P. Are we appropriately referring patients for Short Synacthen Testing?. *Endocrine Abstracts* 2014; 24(24)
- 2) Chitale A, Musonda P, McGregor AM, Dhataria KK. Determining the utility of the 60 min cortisol measurement in the short synacthen test. *Clinical Endocrinology* 2013; 79(1)

