

## PRIORITY BRIEFING

The purpose of this briefing paper is to aid Stakeholders in prioritising topics to be taken further by PenCLAHRC as the basis for a specific evaluation or implementation research project. They were compiled in 2-3 days.

### Can we implement a system that reduces unnecessary Thyroid Function biochemistry test requests?

**Question ID:** 28

**Question type:** Implementation

**Question:** Can we implement a system that reduces unnecessary biochemistry requests across all areas using Thyroid Function Tests as an example

**Current problem:** Cornwall has 140,000 requests for thyroid function tests (TFTs) each year. This has risen from 85,000 requests some 14 years ago although prevalence of thyroid disease has not increased. The majority of TFT results are normal and have been requested for a variety of reasons, including:

- Chronic disease monitoring of thyroid disease
- Routinely performed when a patient is diagnosed with hypertension, cardiovascular disease / stroke and type 2 diabetes
- As part of a 'Tired All The Time' screen

Approximately 20-30,000 of these requests are on patients who take thyroxine medication. The British Thyroid Association have produced guidelines for monitoring patients with thyroid disease and yet it is estimated that 30-50% of the tests ordered on these patients are unnecessary, often patients have 3 or 6 monthly testing when annual review is sufficient. If guidance were followed, an estimated 10-15,000 unnecessary tests could be avoided in Cornwall.

A significant proportion of TFTs are performed as part of an exclusion screen for patients who complain of feeling 'Tired All The Time' (TATT). Often these patients are young, have no other apparent thyroid symptoms warranting a TFT investigation and should not routinely be tested for thyroid disease. It is not known whether TFT requests are always initiated by qualified health professionals. Venesection in general practice is often performed by phlebotomists who may complete the laboratory forms themselves.

**Service and setting:** Primary Care, in particular general practice, is the main setting from where TFTs are requested. Primary Care Trusts are responsible for paying the laboratories for the work they undertake with a block contract. Unlike prescribing, laboratory request habits are not monitored so that general practices cannot currently compare their requesting habits against other practices. Laboratories are struggling to cope with increased demands for multiple blood tests.

**Population:** 1. Patient groups who require thyroid function monitoring, including patients with thyroid disease on thyroxine. 2. Patients with related disease such

as diabetes and cardiovascular disease. 3. Patients with symptoms that could suggest thyroid disease.

**Proposed solution:** 1. Changing practitioner behaviour for requesting TFTs by implementing recommended guidelines for routine testing.

2. Monitoring of general practice investigation request patterns for self-assessment

3. The practice of removing the 'tick box' from laboratory request forms has demonstrated dramatic reductions in requesting practice elsewhere.

4. Ensure lab requests are made by qualified health professionals who have provided relevant clinical details to support request.

If a system were implemented similar to the existing prescribing practice, whereby every general practice were given data on their investigation patterns, it would be evident where the outlying practices are.

**Outcome:** •Implementation of guidance for routine monitoring of thyroid disease.

•More selective use of TFT as a screening test for symptoms of tiredness

•A reduction in the number of unnecessary tests

TFT testing is one of many investigations that could, by effective implementation of guidelines and selective requesting, save money without compromising patient care.

**Thyroid disease:** This is where the performance of the thyroid gland is altered, leading to hyper-or hypo-thyroidism. Hypo-thyroidism is a condition where not enough thyroid hormones are being produced, this can lead to symptoms such as fatigue, depression, muscle cramps, skin problems, goitre and poor muscle tone. Hyper-thyroidism is the reverse condition where there is over-production of thyroid hormones leading to symptoms such as weight loss, anxiety, fatigue, irritability, hyperactivity, palpitations, sweating and shortness of breath. Both these conditions tend to be more common in women than in men and are rarely fatal.

**Thyroid Function Tests (TFT):** These tests are the most commonly performed tests in serum used to establish if there is thyroid dysfunction or to monitor the response to therapy. The majority of thyroid disorders present to and are managed initially within General Practice. Specialist thyroid physicians, who are usually hospital-based Clinical Endocrinologists, and surgeons are involved at a later stage in many cases. Virtually all thyroid function testing currently takes place in hospital Clinical Biochemistry laboratories.

**The Health Problem:**

The prevalence of thyroid disease in the UK population is approximately 1%. 10 million TFTs are ordered nationally per year at a cost of over £30million. The majority of TFT results are normal and a high proportion are believed

unnecessary. Individualised monitoring of TFTs in those with thyroid disease is recommended and would be more cost effective. Only 20-30% of patients who complain of being 'tired all the time' have a discernible physical disease. Up to 50% of cases have a mainly psychological cause, with tiredness often a cardinal feature of depression. Around 75% of cases can be found to be associated with some form of psychological distress.

Each TFT costs the laboratory £2.50-3.00. These costs do not include administration, technician or clinical staff time in the laboratory or general practice setting, nor the equipment used in primary care. At a conservative estimate these additional costs would more than double the costs per test. Assuming such an overall cost of £6 per test, and if a 30% reduction could be made in the 140,000 tests currently requested, this would save about £252,000 per year in Cornwall alone.

Service user - There are further, unquantifiable costs to patients who have to attend appointments at their general practice clinic for venesection. This often means travelling long distances, requiring lifts from family or neighbours or paying for taxis. Thyroxine medication is often adjusted unnecessarily and too frequently by the clinician, who may seek to ensure TFTs are within normal reference ranges even when the patient is asymptomatic.

### **Guidelines:**

The UK Guidelines for the Use of Thyroid Function Tests (2006) developed by British Thyroid Association, the Association for Clinical Biochemistry, and the British Thyroid Foundation have suggested screening is inappropriate although some funding may be justified for people at menopause or with symptoms. Clear guidelines for monitoring are given.

The National Screening Committee are currently revising their guidelines on thyroid disease screening.

### **NHS Priority:**

#### **Regional**

#### **SW SHA Priorities framework 2008-11**

- improve the productivity of clinical activity by at least £700million per annum by 31 March 2014

QUIPP has a priority to reduce procedures of limited clinical benefit.

#### **Local**

- achieve financial balance

### **Existing Research:**

#### **Published research**

There had been very little research investigating ways to reduce thyroid function test requests specifically but there is a substantial amount of research (beginning in 1982) looking at the problem in a broader context. In 2000 a Cochrane review<sup>1</sup> on 'Audit and feedback: effects on professional practice and health care outcomes' was published. The review, although reportedly based on poorly reported studies, concludes that audit and feedback can sometimes be an effective strategy to reduce the frequency of diagnostic test ordering. Since then a number of studies have investigated various methods for reducing diagnostic test ordering. Much of this research is centred on reducing diagnostic test ordering in hospital<sup>2,3,6-9</sup> but there has also been some investigation at the primary (GP) health service level<sup>4,5</sup>. Methods include providing clinicians with cost information for each test<sup>8,9</sup>, 'traffic light' authorisation processes<sup>2</sup>, educational interventions<sup>3</sup>, redesigning pathology request cards<sup>4</sup>, creating group plans and guidelines<sup>5</sup>, using computer software for treatment protocols and clinician prompts<sup>6</sup>, and monitoring and educational visits from laboratory staff<sup>7</sup>. The majority of the studies<sup>2-4,6-8</sup> report their method as being successful in reducing diagnostic test ordering with results ranging from 7% to 24% overall reduction for specific tests<sup>3,6,7</sup>. No studies report an increase in diagnostic test ordering but some are concerned about the cost-effectiveness of their strategy<sup>5,9</sup> which is something that has not been widely investigated.

### **Ongoing research**

No ongoing research was identified in this topic area.

### **Feasibility:**

### **References:**

1) Thomson O'Brien, M. A., A. D. Oxman, et al. (2000). "Audit and feedback: effects on professional practice and health care outcomes." Cochrane Database Syst Rev(2): CD000259.

BACKGROUND: Audit and feedback has been identified as having the potential to change the practice of health care professionals. OBJECTIVES: To assess the effects of audit and feedback on the practice of health professionals and patient outcomes. SEARCH STRATEGY: We searched MEDLINE up to June 1997, the Research and Development Resource Base in Continuing Medical Education, and reference lists of related systematic reviews and articles. SELECTION CRITERIA: Randomised trials of audit and feedback (defined as any summary of clinical performance of health care over a specified period of time). The participants were health care professionals responsible for patient care. DATA COLLECTION AND ANALYSIS: Two reviewers independently extracted data and assessed study quality. MAIN RESULTS: Thirty-seven studies were included, involving more than 4977 physicians. The reporting of study methods was inadequate for almost all studies. In 31 out of 37 studies the randomisation process could not be determined. Information regarding data analysis was also lacking. For example, power calculations were not mentioned in 27 out of 37 studies. A variety of behaviours were targeted including the reduction of

diagnostic test ordering, prescribing practices, preventive care, and the general management of a problem, for example hypertension. Twenty-eight studies measured physician performance, one study targeted patient outcomes in diabetes and the remaining eight studies measured both physician performance and patient outcomes. The relative percentage differences ranged from -16% to 152%. The clinical importance of the changes was not always clear.

REVIEWER'S CONCLUSIONS: Audit and feedback can sometimes be effective in improving the practice of health care professionals, in particular prescribing and diagnostic test ordering. When it is effective, the effects appear to be small to moderate but potentially worthwhile. Those attempting to enhance professional behaviour should not rely solely on this approach.

2) Phan, T. D., K. K. Lau, et al. (2006). "Stratification of radiological test ordering: its usefulness in reducing unnecessary tests with consequential reduction in costs." Australas Radiol **50**(4): 335-8.

This study examines the effectiveness of an automated, stratified system of radiological test ordering, known as 'Traffic Lights', in reducing the number of unnecessary tests and their associated costs. The system involves stratification of radiological tests into three groups, denoted by red, amber and green colours. 'Red' tests must be authorized by a consultant. 'Amber' tests must be signed by a registrar or authorized by a consultant. 'Green' tests can be ordered directly by residents or interns. In the 4 months after the introduction of 'Traffic Lights', each radiological method showed a reduction in both the number of tests and their associated costs. The reduction was consistent across both medical and surgical groups. Analysis of data 20 months immediately after the introduction of 'Traffic Lights' also showed a consistent reduction in the total number of tests, suggesting that the changes are sustainable and unlikely to be due to seasonal variation. Combined with evidence-based medicine protocols, this stratified system of radiological test ordering should ensure the safety, quality and appropriateness of imaging tests and minimize overall patient radiation dose.

3) Calderon-Margalit, R., S. Mor-Yosef, et al. (2005). "An administrative intervention to improve the utilization of laboratory tests within a university hospital." Int J Qual Health Care **17**(3): 243-8.

BACKGROUND: Improving the appropriateness of testing behavior and reducing the number of laboratory tests have been recognized as essential parts of quality improvement. OBJECTIVE: To assess the effectiveness of an administrative and a short-term educational intervention aimed at reducing clinical biochemistry laboratory utilization. DESIGN: An analysis comparing utilization of laboratory tests performed on in-patients before and after the intervention. SETTING: Computerized database of all laboratory tests performed in Hadassah Ein Kerem Medical Center, Jerusalem, Israel during 1999-2003. INTERVENTION: The administrative intervention included restricting available emergency laboratory tests and frequency of repeated orders. The educational measures included: discussion of the misuse of laboratory tests and its consequences with the hospital medical staff, and presentation of the new restrictive policy. A feedback

of the intervention's results was sent to the wards and reviewed with senior medical staff. MAIN OUTCOME MEASURES: Change in utilization (measured as rates per 100 hospital days) of clinical biochemistry tests by hospital division and by selected laboratory tests. RESULTS: An overall reduction of 19% in laboratory tests (95% CI: 18.8-19.2%) was observed in the year after the intervention. Utilization decreased significantly in all the hospital's medical divisions, within a range of 14.9-43.8%. During the intervention period, utilization of hematology tests was reduced by 7.6% (P = 0.009). Statistically significant reductions were noted in the ordering of all 12 selected clinical biochemistry tests. Although the orders of total cholesterol decreased by 72.2%, the utilization of 'high-volume' tests, such as glucose and electrolytes, showed only a modest decrease (7.9% and 6.9%, respectively). CONCLUSIONS: The present study included all hospital medical staff and covered all the available clinical biochemistry tests. This rather simple and low-cost intervention resulted in significant reductions in clinical biochemistry test orders as well as in the ordering of hematological blood tests.

4) Bailey, J., A. Jennings, et al. (2005). "Change of pathology request forms can reduce unwanted requests and tests." J Clin Pathol **58**(8): 853-5.

BACKGROUND: Developments in clinical and laboratory medical practice have resulted in a large increase in laboratory workload, with considerable financial implications. It has been shown that the design of laboratory request cards can influence patterns of test ordering and possibly reduce inappropriate requests. AIMS/METHODS: To redesign pathology request cards with a view to reducing inappropriate test requesting. RESULTS: A redesign of the request cards used by general practitioners in the Bradford area led to a significant reduction in the ordering of specific investigations. CONCLUSIONS: The redesigning of pathology request cards can have a beneficial effect on test requesting.

5) Verstappen, W. H., F. van Merode, et al. (2004). "Comparing cost effects of two quality strategies to improve test ordering in primary care: a randomized trial." SO: International journal for quality in health care : journal of the International Society for Quality in Health Care / ISQua(5): 391-8.

OBJECTIVE: To determine the costs and cost reductions of an innovative strategy aimed at improving test ordering routines of primary care physicians, compared with a traditional strategy. DESIGN: Multicenter randomized controlled trial with randomization at the local primary care physicians group level.

SETTING: Primary care: local primary care physicians groups in five regions of the Netherlands with diagnostic centers. STUDY PARTICIPANTS: Twenty-seven existing local primary care physicians groups, including 194 primary care physicians. INTERVENTION: The test ordering strategy was developed systematically, and combined feedback, education on guidelines, and quality improvement sessions in small groups. In regular quality meetings in local groups, primary care physicians discussed each others' test ordering behavior, related it to guidelines, and made individual and/or group plans for change. Thirteen groups engaged in the entire strategy (complete intervention arm), while 14 groups received feedback only (feedback arm). MAIN OUTCOME MEASURE:

Running costs, development costs, and research costs were calculated for the intervention period per primary care physician per 6 months. The mean costs of tests ordered per primary care physician per 6 months were assessed at baseline and follow-up. RESULTS: The new strategy was found to cost 702.00, while the feedback strategy cost 58.00. When including running costs only, the intervention was found to cost 554.70, compared with 17.10 per primary care physician per 6 months in the feedback arm. When excluding opportunity costs for the physicians' time spent, the intervention was found to cost 92.70 per physician per 6 months in the complete intervention arm. The mean costs reduction that physicians in that arm achieved by reducing unnecessary tests was 144 larger per physician per 6 months than the physicians in the feedback arm (P = 0.048). CONCLUSION: On the basis of our findings, including the expected non-monetary benefits, we recommend further long-term effect and cost-effect studies on the implementation of the quality strategy.

6) Neilson, E. G., K. B. Johnson, et al. (2004). "The impact of peer management on test-ordering behavior." *Ann Intern Med* **141**(3): 196-204.

BACKGROUND: Laboratory testing of hospitalized patients, although essential, can be expensive and sometimes excessive. Attempts to reduce unnecessary testing have often been difficult to implement or sustain. OBJECTIVE: Use of peer management through a resource utilization committee (RUC) to favorably modify test-ordering behavior in a large academic medical center. DESIGN: Interrupted time-series study. SETTING: Medical center with inpatient care provider order entry (CPOE) system and database of ordered tests. PARTICIPANTS: Predominantly housestaff physicians but all clinical staff (attending physicians, housestaff, medical students, nurses, advance practice nurses, and other clinical staff) at Vanderbilt University Hospital who used CPOE systems. INTERVENTION: The RUC analyzed the ordering habits of providers during previous years and made 2 interventions by modifying software for the CPOE system. The committee first initiated a daily prompt in the system that asked providers whether they wanted to discontinue tests scheduled beyond 72 hours. After evaluating this first intervention, the committee further constrained testing options by unbundling serum metabolic panel tests (sodium, potassium, chloride, bicarbonate, glucose, blood urea nitrogen, and creatinine tests) into single components and by reducing the ease of repeating targeted tests (including electrolyte, blood urea nitrogen, creatinine, and glucose tests; electrocardiography; and portable chest radiography). MEASUREMENTS: Pre- and postintervention volumes of tests; proportion of patients with abnormal targeted chemistry levels after 48 hours; rates of repeated admission, transfer to intensive care units, and mortality; adjusted coefficient of variation for test ordering; and length of stay. RESULTS: Voluntary reduction of testing beyond 72 hours (first intervention) decreased orders for metabolic panel component tests by 24% (P = 0.02) and electrocardiograms by 57% (P = 0.006) but not orders for portable chest radiographs. Prospective constraints on recurrent test ordering with panel unbundling (second intervention) produced an additional decrease of 51% for metabolic panel component tests (P < 0.001) and 16% for portable chest

radiographs ( $P = 0.03$ ). Incidence of patients with abnormal targeted blood chemistry levels after 48 hours decreased after the intervention ( $P = 0.02$ ). Postintervention-adjusted coefficients of variation decreased for metabolic panel component tests ( $P = 0.03$ ) and electrocardiography ( $P = 0.04$ ). Rates of (adjusted) monthly readmission, transfers to intensive care units, hospital length of stay, and mortality were unchanged. LIMITATIONS: Other activities occurring during the time period of the interventions might have influenced some test-ordering behaviors, and we assessed effects on only a limited number of commonly ordered tests. CONCLUSIONS: Peer management reduced provider variability by addressing the imperfect ability of clinicians to rescind testing in a timely manner. Hospitals with growing health care costs can improve their resource utilization through peer management of testing behaviors by using CPOE systems.

7) Bunting, P. S. and C. Van Walraven (2004). "Effect of a controlled feedback intervention on laboratory test ordering by community physicians." Clin Chem **50**(2): 321-6.

BACKGROUND: Most studies of interventions to reduce laboratory test utilization have occurred in academic hospital settings, used historical controls, or have had short post intervention follow-up. Interventions with the greatest impact use multiple approaches, are repeated regularly, include comparisons with physician peers, and have a personal approach. We determined whether laboratory test utilization by community physicians could be reduced by a multifaceted program of education and feedback. METHODS: We identified 200 physicians who ordered the largest number of common laboratory tests during 1 year in a nonhospital, commercial community (reference) laboratory. They were assigned to intervention and control groups (100 each). Intervention physicians were visited individually up to three times by laboratory representatives over a 2-year period. At each visit, educational material and the physician's personal laboratory test utilization data were presented and discussed briefly in general terms, with the latter compared with utilization data for the physician's peers. Overall test utilization rates 1 year before, during, and 2 years after the intervention were measured using population-based databases. Time-series analysis was used to determine the effect of the intervention on laboratory test utilization. RESULTS: The two groups began with similar test utilization: control group,  $4.06 \times 10^6$  tests in  $1.48 \times 10^6$  visits (2.73 tests/visit); intervention group,  $3.90 \times 10^6$  tests in  $1.41 \times 10^6$  visits (2.77 tests/visit). During the 2-year intervention, intention-to-treat analysis showed that utilization decreased significantly in the intervention group compared with the controls [relative reduction of 7.9% ( $P < 0.0001$ ); absolute reduction of 0.22 tests/visit (95% confidence interval, 0.20-0.24)]. This difference persisted until the end of study observation, or more than 2 years after the intervention ended. CONCLUSION: A multifaceted education and feedback strategy can significantly and persistently decrease laboratory utilization by practicing community physicians.



8) Seguin, P., J. P. Bleichner, et al. (2002). "Effects of price information on test ordering in an intensive care unit." Intensive Care Med **28**(3): 332-5.  
OBJECTIVE: To determine if daily information on the price of common laboratory tests and chest X-ray could significantly influence test ordering by physicians and decrease the costs. DESIGN: A prospective observational and sequential study. SETTING: A 21-bed surgical intensive care unit of a university hospital. PATIENTS: All patients admitted during a 4-month period. INTERVENTIONS: A 2-month period served as control (period I). During a consecutive 2-month period (period II) physicians were informed about the costs of seven common diagnostic tests (plasma and urinary electrolytes, arterial blood gases, blood count, coagulation test, liver function test and chest X-ray). The number of tests ordered and costs during the two periods were compared. MEASUREMENTS AND RESULTS: A total of 287 patients were included (128 in period I and 159 in period II). Information about age, gender, Severe Acute Physiologic Score II, McCabe score, intensive care unit length of stay and mortality were collected and were not statistically different between the two study periods. Except for liver function tests, all the tests evaluated were less frequently prescribed when physicians were aware of the charges, irrespective of whether the tests were routine or requested during an emergency. Nevertheless, a significant reduction was obtained only for arterial blood gases and urinary electrolytes. Overall analysis of the expenditures (in Euros) showed a significant 22% decrease in period II (341+/-500 versus 266+/-372 Euros,  $p < 0.05$ ). CONCLUSION: Providing price information to physicians was associated with a significant reduction for arterial blood gases and urinary electrolytes tests ordered and was significantly cost-saving.

9) Rudy, D. W., M. Ramsbottom Lucier, et al. (2001). "A pilot study assessing the influences of charge data and group process on diagnostic test ordering by residents." SO: Academic medicine : journal of the Association of American Medical Colleges(6): 635-7.  
PURPOSE: Providing charge data to resident physicians has been shown to reduce the amounts spent on diagnostic testing. This pilot study sought to determine the influences of charge data and group decision making on diagnostic test ordering by internal medicine residents. METHOD: In an interactive workshop, 23 internal medicine residents received a hypothetical case. They completed an 18-item questionnaire estimating charges for diagnostic tests and then "ordered" tests. The residents were then randomly divided into groups that either received charge data, received charge data after ordering tests, or received no charge data. The groups ordered tests by consensus. Tests were weighted for appropriateness (+1 to +6) and inappropriateness (-1 to -6). Analyses compared individual and group decisions and effect of availability of charge data. RESULTS: Residents with access to charge data spent less on tests, but also had lower appropriateness scores. The appropriateness of the diagnostic workup was better by groups than by individuals, but cost more. CONCLUSION: Cost-containment interventions targeted towards doctors in training need to address the effect on quality of care and the influence of the

group process in clinical decision making. Group diagnostic decisions may be more costly, but more appropriate.