Effects of an Educational Feedback Strategy on Physician Utilization of Thyroid Function Panels

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Physician overutilization of clinical laboratory tests has been well documented, but previous attempts aimed at changing this behavior have met with limited success. An educational feedback strategy was used to try to change physician behavior in ordering thyroid function panels (TFPs) in the Duke-Watts Family Medicine group practice. The rate of TFP ordering significantly decreased for three months following the intervention but rose to the preintervention level within six months. Senior residents appeared to be more responsive to the educational feedback than junior residents. Results obtained in this and other studies suggest that other factors compete with educational approaches in motivating physician behavior, and these override rational decision making.

Several studies have demonstrated that physicians overutilize laboratory tests.[1-5] This is not surprising since, of the three components of clinical assessment—history, physical examination, and laboratory evaluation—least educational emphasis is devoted to the proper use of the clinical laboratory.[5-8] As issues of cost containment and quality of care have become more pressing, strategies have been developed for attempting to alter physician test-ordering behavior. Most of these attempts have met with limited success.

This study describes an educational feedback strategy which attempts to change physician ordering behavior in a Family Medicine Center ambulatory model practice. It was postulated that if physicians took an active part in evaluating appropriate criteria for ordering laboratory tests, their utilization of those tests would improve. The authors chose to study the thyroid function panel (TFP-T_4 and T_3 resin uptake) because of preliminary indications that it was overutilized in the practice. The study consists of an initial chart audit conducted to define the clinical indications used for ordering TFPs; a survey conducted among residents to identify the ideal indications for ordering TFPs; an educational feedback conference; and a second chart audit to assess the results of the intervention.

Methods

The charts of all patients in the Duke-Watts Family Medicine Program who had TFPs ordered during the six-month period, October 1976 through March 1977, were audited independently by two

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Table 1. Indications for Obtaining Thyroid Function Panels Results of Preliminary Audit

	% Total Tests N=126
Previous Thyroid Surgery	8
Goiter/Neck Mass	14
Thyroid Disease History	16
Multiple Thyroid Symptoms/Signs	7
Obesity	8
Amenorrhea	5
Neck Irradiation	2
Weight Loss	6
Hypertension	4
Anxiety	4
Altered Mental Status	3
Dizziness	2
Fatigue	2
Pain/Paresthesias	6
Palpitations/Tachycardia	2
Patient Expectation	2
Other	9

Table 2. Results of Survey: Rating Importance of Ordering Thyroid Function Panels*

	Mean Score
High Indication	
Previous Thyroid Surgery	1.1
Goiter/Neck Mass	1.1
Thyroid Disease History	2.0
Multiple Thyroid Symptoms/Signs	2.6
Low Indication	
Obesity	3.3
Amenorrhea	3.4
Neck Irradiation	3.6
Weight Loss	3.8
Hypertension	4.5
Anxiety	4.5

*Mean Score Values: 1=Essential; 5=Unwarranted

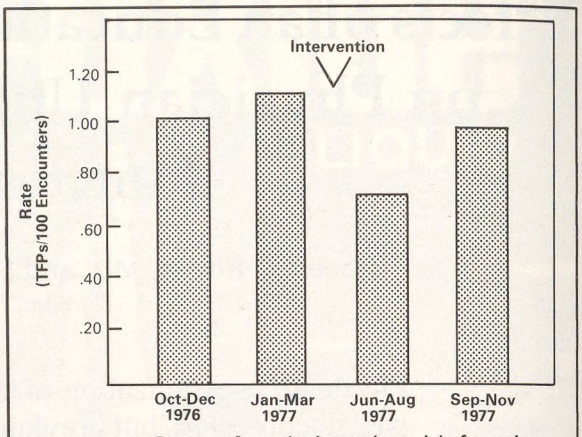

Figure 1. Rate of ordering thyroid function panels (TFPs) by 3 month quarters

physicians. Based on progress notes kept in the problem-oriented format, the auditors classified all TFPs by the problem or indication for which they were ordered. Each patient was considered only once. If a patient had more than one TFP ordered per audit period, the first test was used.

After the chart audit data were summarized, a survey was designed to determine how "essential to good medical care" practice members considered the TFP in the evaluation of ten of the common problems identified by the audit. Audit results were not available to the physicians before the survey was conducted. The survey consisted of ten case vignettes taken from actual patient encounters and summarized in one or two sentences. For each survey case, residents were asked to rate the importance of obtaining a TFP on a five-point scale that ranged from "essential" to "unwarranted." To complete the educational strategy, the audit and survey results were presented at a conference where appropriate indications for ordering TFPs and discrepancies between the ideal and actual practice in the Family Medicine Center were discussed. The conference focused on the process of clinical decision making, using TFP ordering as an example, in the hope that physicians would gain awareness of factors that adversely influence their behavior. Since not all residents were able to attend the conference, a memo summarizing the findings was sent to all physicians following the conference.

To assess the effects of the educational strategy a re-audit was performed for the six-month follow-up, June through November 1977. The re-audit was performed by the same two physicians

Table 3. Indications for Obtaining Thyroid Function Panels for Two Audit Periods*

	% Total Tests Audit Period I N=126	% Total Tests Audit Period II N=90
Previous Thyroid Surgery	8	10
Goiter/Neck Mass	14	11
Thyroid Disease History	16 (45)	26 (53)
Multiple Thyroid Symptoms/Signs	7	6
Obesity	8	4
Amenorrhea	5	4
Neck Irradiation	2 (29)	0 (19)
Weight Loss	6	7
Hypertension	4	2
Anxiety	4	2
Altered Mental Status	3	6
Dizziness	2	1
Fatigue	2	3
Pain/Paresthesias	6	3
Palpitations/Tachycardia	2	3
Patient Expectation	2	2
Other	9	9

*Survey vignette indications above solid line, high indications above dotted line

in a similar manner to the first. Each TFP was placed into one of the original categories identified in the first audit. The auditor agreement was 85 percent for the combined audit periods.

Results

During the preintervention audit period 38 faculty, residents, and allied health care providers ordered TFPs for 126 patients. Table 1 shows the distribution of TFP indications during the first audit period. Ninety-one percent of the TFPs ordered fit into 16 categories.

The survey results for the 65 percent of the Family Medicine Center providers who participated are seen in Table 2. Practice members considered previous thyroid surgery, goiter/neck mass, thyroid disease history, and multiple thyroid symptoms and/or signs to be appropriate or "high" indications for ordering TFPs. Indications with mean scores greater than three were considered to be of "low indication."

During the six-month period following the conference, 36 providers ordered TFPs for 90 patients. The rate of TFP ordering dropped significantly for the first three months of this period ($P<0.05$, statistical test for the difference between two independent proportions), as shown in Figure 1. The rate rose, however, to the preintervention ordering level during the subsequent three months. Table 3 compares the indications for obtaining TFPs for the pre and postintervention audits. When the distribution of tests was divided into "high" and "low" indication groups, "high indication" tests (seen above the dotted line) increased from 45 percent in the preintervention to

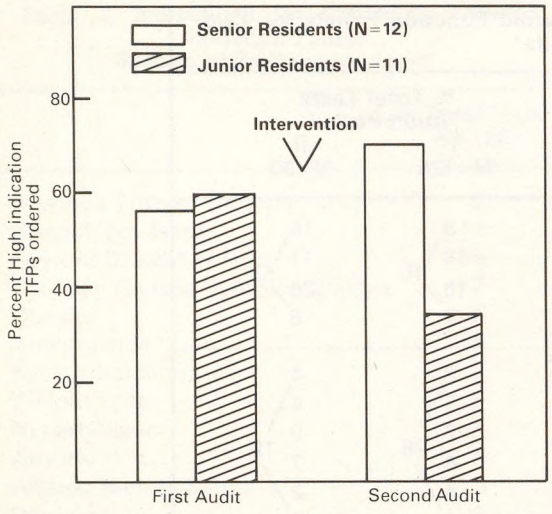

Figure 2. Percent of "high indication" thyroid function panels ordered by senior and junior residents for two audit periods

53 percent in the postintervention audit period. The frequency of ordering low indication TFPs decreased from 29 percent to 19 percent. These changes in frequency were not statistically significant ($P>0.05$).

For 23 residents who were present in the practice for both audit periods, no trend toward reduced TFP ordering could be seen; 12 had lower rates after the conference, ten had increased rates, and one was unchanged. When the residents were grouped according to training level, a difference emerged. Eleven of the 12 senior residents reduced their TFP ordering rates, whereas only two of 11 junior residents had decreased rates ($P<0.05$). Initially, "high indications" tests comprised 54 percent of the TFPs ordered by the senior residents and 60 percent of those ordered by junior residents (Figure 2). After the intervention, 70 percent of tests ordered by the senior residents and only 34 percent by the junior residents were highly indicated. This trend was not statistically significant.

Discussion

Overutilization of clinical laboratory tests by physicians is well recognized.[1-6, 9-12] In 1975, Bold and Corrin[1] reported that 11 percent of the tests ordered by house staff in their institution were unnecessary. Dixon and Laszlo[9] showed that only five percent of laboratory tests ordered on a medical ward altered patient care, and that a 25 percent decrease in the number of tests ordered did not sacrifice any essential information about their patients. Griner and Liptzin[5] demonstrated that a 27 percent decrease in the number of laboratory tests ordered for diabetic ketoacidosis between 1966 and 1969 did not affect the outcome of care as measured by length of hospitalization. Others have criticized the increasing use of laboratory tests obtained for automated screening programs and as routine procedures for hospital admissions.[2-5]

Laboratory overutilization affects many aspects of the health care system: heavy work demands may create morale problems among laboratory personnel and lead to errors[1,5,6]; iatrogenic complications in hospitalized patients are reported to be directly proportional to the number of tests and procedures performed[13]; and health care costs rise with the proliferation of unnecessary tests.[2,4-7]

Various methods have been attempted to change physician behavior.[5,7-12] Most common among these have been programs designed to educate physicians in the appropriate use of the laboratory and to offer feedback to those who are not using it properly. Schroeder[7] ranked physicians according to cost of laboratory work and pharmaceuticals ordered, and distributed the results to the individual physicians. This cost audit feedback produced a 29 percent reduction in the laboratory costs for a brief period of time, but no reduction in pharmaceutical costs. After an educational feedback program failed to alter behavior, Williamson[8] was able to change actions taken on abnormal screening results by forcing physicians to remove fluorescent tape which covered the abnormal findings. Eisenburg[12] demonstrated a significant decrease in the number of prothrombin-time tests performed after an educational program, only to see a deterioration to pre-educational levels over 12 months time.

Medical care review and insurance claims denial have also been used to change physician behavior. In a study on the use of injections in New Mexico, Brook and Williams[11] reported a 60 percent decrease in the number of injections given after a combined educational and claims-denial intervention. The negative financial incentives con-

tributed more than the educational program to the observed change.

Still another approach has been to limit the number of tests a physician can order. After ordering constraints were imposed, Dixon and Laszlo[9] demonstrated an 18 percent decrease in the number of tests ordered. Using semistructured interviews one investigator[10] showed that when physicians were asked to order only tests which were absolutely necessary, screening and routine tests were deleted. A marked increase in the number of tests ordered occurred when physicians were asked to order tests as if the patient was to be a research or medical grand rounds case. House staff and newly trained physicians relied more on technological advances and ordered more tests than their more experienced colleagues.

The inability of educational strategies to sustain lasting improvements in physician behavior has distressing implications for continuing medical education programs. The reasons why seemingly rational approaches do not create lasting patterns of reduced laboratory test ordering are not clear. Physicians in this practice took an active role in establishing test ordering criteria and together explored possible reasons for faulty decision making processes in ordering TFPs. The strategy did not permanently change their test ordering patterns. Other factors must compete with rational decision making in motivating physician behavior. These factors tend to persist as motivating forces and finally override the effects of educational programs.

The difference in behavior change between the senior and junior residents was an unexpected finding and could not be explained by differential attendance rates at the conference. One might anticipate that behavior would be less easily modified as practice habits become entrenched through repetition. Perhaps, the greater influence of the educational program on senior residents reflects a time of increased educational receptivity. This may be explained in part by the fact that they have acquired some distance from their medical school and internship inhospital training, where anxiety and insecurity breed an atmosphere in which overutilization of laboratory tests is common.

Several approaches to solving the problem of physician malutilization of the laboratory seem reasonable. Perhaps repetition of educational programs can produce a lasting behavioral change. Appropriate intervals for reinforcement remain to be determined, however. The timing of physician education may be critical. Since established behavior is difficult to change, desired behavior should be emphasized early in training. More educational emphasis regarding proper use of the clinical laboratory should occur in medical school and at the start of postgraduate experience before poor behavior is entrenched.

The factors which successfully compete with rational decision making need identification and clarification. Better understanding of what motivates physicians to behave as they do is needed. Perhaps attacking the problem at this more "basic" level can lead to more efficient, cost effective health care.

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