The inclusion of educational messages in laboratory reports aids to complete the diagnostic workup of hyperglycemia.

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Running Title: Laboratory reports as educational tools

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ABSTRACT

**Objective:** to evaluate whether educational messages regarding the OGTT indications in the laboratory reports increases the number of OGTT appropriately requested.

**Methods:** this message was printed on the lab reports of individuals with a FPG between 5.5-6.9 mmol/L: “A FPG between 5.5 and 6.9 mmol/L is considered abnormal by the American Diabetes Association (impaired fasting glucose). An OGTT is recommended if the patient does not have a diagnosis of diabetes and suffers from conditions associated with an increased risk for having type 2 diabetes (i.e. overweight, high blood pressure, abnormal plasma lipids or family history of diabetes)”. The number of educational messages printed was 81,099. Results: the intervention resulted in a significant increase in the number of OGTT requested. The OGTT number increased from 78±19 tests per month to 268±48 per month. The intervention resulted in a greater proportion of cases that had an abnormal OGTT.
There is a significant delay in diagnosing type 2 diabetes. The oral glucose tolerance test (OGTT) is the most sensitive test (1). Its use has been recommended by several clinical guidelines (2), and it allows an earlier diagnosis of diabetes in comparison with the fasting plasma glucose (FPG) criteria (3). This test should be considered in the presence of a FPG between 5.5-6.9 mmol/L. However, the test is not frequently requested due to test-related inconveniences and insufficient information regarding the FPG range for which the OGTT is useful. A large percentage of physicians consult the lab reports reference ranges to make clinical decisions (4). Our objective was to evaluate whether the inclusion of educational messages regarding the OGTT indications in the laboratory reports increases the number of OGTT appropriately requested.

RESEARCH DESIGN AND METHODS

The study was done in collaboration with México's largest network of private laboratories (Laboratorio del Chopo). It consists of 105 offices located in 7 cities and is principally used by primary care physicians. The intervention started in February 2006. The following message was automatically printed on the lab reports of all individuals with a FPG between 5.5-6.9 mmol/l: “A FPG between 5.5 and 6.9 mmol/L is considered abnormal by the American Diabetes Association (impaired fasting glucose). An OGTT is recommended if the patient does not have a diagnosis of diabetes and suffers from conditions associated with an increased risk for having type 2 diabetes (i.e. overweight, high blood pressure, abnormal plasma lipids or family history of diabetes)” (5).

The number of OGTT requested from February 2006 to September 2007 was calculated and this value was compared with the number requested from January 2004 to January 2006. The observation period before and after the intervention was extended as much as possible in order to avoid the effect of seasonal variations on the number of requested tests. In addition, this number was compared with the number of requests received for other common laboratory tests (blood count, FPG, blood chemistry panel and microalbuminuria). The number of OGTT requested before and after the intervention was compared using the unpaired t test. Additional cost per detected affected case was estimated by dividing the additional costs that resulted from the intervention by the number of abnormal subjects found.

RESULTS

The inclusion of the educational message regarding the use of the OGTT resulted in a significant increase in the number of OGTT requested. During the period January 2004-January 2006, the mean number of OGTT performed per month was 78±19 (range 48-116). The percentage of OGTTs that had a FPG in the IFG range in the 3 months prior was 19.1%.

The intervention started on February 2006. The number of educational messages printed was 81,099. The OGTT number increased to 268±48 per month (range 148-351) from February 2006 to September 2007 (a 339% increment, p<0.001) (figure 1). After the intervention, the percentage of OGTTs that had a FPG in the IFG range in the 3 months prior increase to 30.4% (p<0.05 compared against the pre-intervention observation period). The increase in the number of requested OGTT tests was significantly greater compared to that observed for other laboratory tests. For example, the number of blood counts requested increased in the same time periods only by 19% (from 14,564 to 17,363 tests/month). A similar percentual change was observed for the chemistry panel (+18.3%) and microalbuminuria (+11.5%). The number of OGTT requests increased constantly during the first three months and remained stable during the following 13 months (figure 1).
Finally, intervention resulted in a greater proportion of cases that had an abnormal OGTT. Prior to the intervention, 27% of the OGTTs had an abnormal result (diabetes 10.4%, impaired glucose tolerance 16.6% and normal glucose tolerance 73%). This percentage was increased to 52.6% (diabetes 19.1%, impaired glucose tolerance 33.5% and normal glucose tolerance 47.4%).

The additional cost per detected diabetic case was low ($179.78 US dollars). The amount was even lower for impaired glucose tolerance ($94.04 US dollars) or for detecting cases with either diabetes or impaired glucose tolerance ($61.74 US dollars).

DISCUSSION
Our results demonstrate that the inclusion of educational messages in laboratory reports is a useful approach to help physicians and patients to undergo a complete diagnostic evaluation. Here, we applied this strategy to increase the likelihood of having a diagnostic OGTT in patients at risk of diabetes. The intervention resulted in a 339% increment in the number of requested tests over a 20 month-period; 48.5% of the OGTTs had an abnormal result. More importantly, our low cost intervention allowed the detection of 311 diabetic cases and 546 patients with glucose intolerance by means of the performance of an OGTT, a test that has proved to be cost effective compared to the fasting plasma glucose test (6). Furthermore, this approach increased the proportion of OGTT that had an abnormal result. The same technique could be applied to remind patients and physicians to undergo a yearly lipid profile, microalbuminuria measurements, and eye examinations. In summary, educational messages in laboratory reports in the diagnostic workup of hyperglycemia.
REFERENCES


Figure 1. Number of OGTTs requested during the study