Larger differences in utilization of rarely requested tests in primary care in Spain

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On behalf of the Pilot Group of the Appropriate Utilization of Laboratory Tests

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Abstract

Introduction: The study was performed to compare and analyze the inter-departmental variability in the request of rarely requested laboratory tests in primary care, as opposed to other more common and highly requested tests.

Materials and methods: Data from production statistics for the year 2012 from 76 Spanish laboratories was used. The number of antinuclear antibodies, antistreptolysin O, creatinine, cyclic citrullinated peptide antibodies, deaminated peptide gliadine IgA antibodies, glucose, protein electrophoresis, rheumatoid factor, transglutaminase IgA antibodies, urinalysis and uric acid tests requested was collected. The number of test requests per 1000 inhabitants was calculated. In order to explore the variability the coefficient of quartile dispersion was calculated.

Results: The smallest variation was seen for creatinine, glucose, uric acid and urinalysis; the most requested tests. The tests that were least requested showed the greatest variability.

Conclusion: Our study shows through a very simplified approach, in a population close to twenty million inhabitants, how in primary care, the variability in the request of laboratory tests is inversely proportional to the request rate.

Key words: primary care; laboratory proficiency testing; clinical laboratory services; test requesting; preanalytical phase

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Introduction

Test request is the key step in the pre analytical phase (1). Inappropriate tests could be defined as those that could reasonably be avoided at no significant detriment to a patient's care (2). It is very difficult to measure requesting appropriateness in the long term and practically impossible on a daily basis, at least in an automatic and fast way, and especially in laboratories with high workload.

However, it is imperative to investigate how to deal this important topic, to investigate the degree of test requesting variability and inappropriateness in order to correct it through strategies designed and established thorough communication between laboratory and requesting clinicians to reach an optimal laboratory test request. Moreover, it is also a key element to monitor after the establishment of interventions for its adjustment (3).

By comparing test requests in different settings or geographical areas (4,5) where the patient population is similar, it is possible to study the variability in the request of laboratory tests and therefore to estimate one's requesting pattern as compared to others.

Several studies have shown a high variability in the request of laboratory tests in primary care in Spain (6-9). Overall, the least the tests were requested, the more variability was observed (7). The request rate was inversely proportional with the requesting pattern variability. However primary care requests of some esoteric or rarely requested tests has not still been studied. Those results provide a starting point after which it is possible to establish corrective actions to solve over and also under requesting.

Based on this data, it seemed interesting to measure the request of some esoteric tests in primary care and to compare to highly demanded tests to try to confirm that trend and to understand the potential rationale behind their requesting patterns in order to further establish strategies for better request. The hypothesis was that the request rate of laboratory tests was inversely proportional with the requesting pattern variability. The aim of the study is to compare and analyze inter-departmental variability in the request of rarely requested laboratory tests in primary care, as opposed to other more common and highly requested tests.

Materials and methods

Setting

Spain is divided in 17 Autonomous Communities. Every Spanish citizen possesses the Individual Health Care Card, which let access to public health services as a healthcare user throughout the National Health System. The Health system in every Autonomous Community is divided into Health Departments. Each Health Department covers a geographic area and its population. It is composed by several primary care centers and usually a unique Hospital. The laboratory located at the hospital attends the needs of every Health Department inhabitant.

This study presents just part of the results obtained from a large database from the Pilot Group of the Appropriate Utilization of Laboratory Tests, REDCONLAB, working group. The large number of participants and data made it necessary to be published in parts. The research studies the variability of laboratory test request, as a measure of how spread out or closely clustered a set of data regarding demand in different geographical areas is.

Data collection

A call for data was posted *via* email. Spanish laboratories willing to participate in the study were invited to fill out an enrollment form and submit their results online. The dissemination of the questionnaire was addressed to the participants of previous studies of the REDCONLAB group that recommended to other laboratories to join the current edition and sent to us the e-mail addresses of the potential applicants. 141 laboratories were invited to participate.

Numbers of tests requested by all of the general practitioners (GPs) for the year 2012 from laboratories at different hospitals from diverse departments across Spain were used. Each participating laboratory was required to be able to obtain patient data from local Laboratory Information Systems Patient's databases and also to provide data of the organization. The criteria to select tests were to obtain 3 different groups: highly requested tests, moderately requested tests, and rarely requested tests in primary care. In fact studied tests were divided in three groups. First group: glucose and creatinine; second group: urinalysis and uric acid and lastly a third group: antinuclear antibodies (ANA), antistreptolysin O (ASO), cyclic citrullinated peptide antibodies (anti-CCP), deaminated peptide gliadine IgA antibodies (anti-DGP), protein electrophoresis, rheumatoid factor, transglutaminase IgA antibodies (anti-tTG), tests requested was collected.

Data processing

After collecting the data, test-utilization rates were calculated by standardization with the population attended by each laboratory. Rates were expressed as tests *per* 1000 inhabitants. We considered inhabitants the residents in each public Health Departments.

Statistical analysis

All analyses were performed using SPSS Inc. for Windows, Version 16.0. (Chicago, SPSS Inc). Descriptive statistics were generated for test-utilization rates. In order to explore the variability through test-utilization rates comparison the coefficient of quartile dispersion (CQD) was used. Coefficient of variation was not employed due to its higher sensitivity to outliers. CQD was calculated using the first (Q_1) and third (Q_3) quartiles for each data set, as follows: $(Q_3-Q_1)/(Q_3+Q_1)$ (10).

Results

Of the 141 requested laboratories, 76 laboratories, on a voluntary basis, participated in the study, corresponding to a catchment area of 17,679,195 inhabitants (38% of the Spanish population) from 13 different communities throughout Spain. Figure 1 shows the distribution of the different health departments around the country in a map. All laboratories served Primary Health Care Units and also hospital wards. Moreover, every laboratory included in the study performs all of the preselected tests. Table 1 shows the descriptive analysis of every test rate *per* 1000 inhabitants. CQD was up to ten times higher in the less requested tests when compared to glucose. The smallest variation was seen for creatinine, glucose, uric acid and urinalysis, the most requested tests. Note that the tests that are least requested show the greatest variability.

Figure 1. Distribution of the participating health departments (laboratories).
The figure shows a map of Spain with the distribution of the 76 participating laboratories. Note that laboratories located in the same town are marked with a single dot (in alphabetical order: Elche (2), Madrid (4), Murcia (2), Sevilla (2), and Valencia (4).

Figure 2 shows the test utilization rate expressed as a median and the CQD for every studied labora-

Table 1. Summary of rates per 1000 inhabitants, showing the median, the first (Q1) and third (Q3) quartiles and, as magnitudes of variation, interquartile range (IQR) and coefficient of quartile dispersion (CQD) for each data.

Rates *per* 1000 inhabitants	Median	Q1	Q3	IQR	CQD
Glucose	361.53	325.54	401.33	75.79	0.10
Creatinine	342.61	309.77	382.59	18.82	0.11
Uric acid	297.13	224.07	339.95	115.88	0.21
Urianalysis	203.44	162.52	255.31	92.79	0.22
Rheumatoid factor	20.42	14.19	29.80	15.61	0.35
anti-tTG	4.37	2.91	6.35	3.44	0.37
ANA	3.65	2.40	6.26	3.86	0.44
Protein electrophoresis	5.26	2.84	10.19	7.35	0.56
Antistreptolisin antibodies	3.87	1.81	9.78	7.97	0.69
anti-CCP	0.19	0.06	0.69	0.63	0.84
anti-DGP	0.54	0.00	2.48	2.48	1.00

Q1 - first quartile; Q3 - third quartile; IQR - interquartile range (Q3-Q1); CQD - coefficient of quartile dispersion $[(Q_3-Q_1)/(Q_3+Q_1)]$

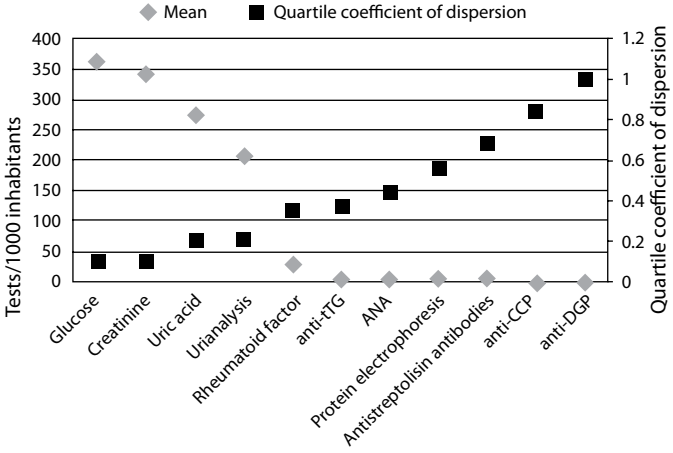

Figure 2. Utilization rate expressed as number of tests *per* 1000 inhabitant, and quartile coefficient of dispersion for every studied laboratory test.

tory test. We can visualize how the request rate was inversely proportional with the requesting pattern variability.

Discussion

Our study shows through a very simplified approach, in a population close to twenty million inhabitants, how in primary care, the variability in the request of laboratory tests is inversely proportional to the request rate.

Every public health care worker should contribute to achieve the goal best outcome for the patient at the best price, with no differences between the different geographical areas or hospitals. A first step to standardize the utilization of diagnostic procedures and hence equity in health care is to study the variability in the request of such tests between the different geographic areas (11).

Correct utilization of laboratory tests is paramount. First, laboratory data intervene in 70% of clinical decisions (12). Second, the consequence of inappropriate test request is not just financial, but also implies missing certain diagnosis when a test is under requested, or delivering an unacceptable number of false positive results when over requested (13). Besides, the latter contributes to an unnecessary increased workload; laboratory professionals cannot provide every laboratory data the attention it deserves, with increased risk that high-value data for clinical decision making to be hidden by invaluable information (14).

The variability of the least demanded tests in primary care has not been previously compared to the one for the highly requested tests. In a first group, we included two highly requested tests, glucose and creatinine, that are considered routine laboratory tests for preventive health exams to promote healthier behaviors; in fact their high demand may be justified and request is very uniform between areas. Secondly, we considered two less requested tests: urinalysis and uric acid. Both are not recommended as part of a health checkup. In primary care, uric acid is mainly limited to patients with suspected gout. It is known that uric acid is usually requested out of habit and may be over requested (11). This could be potentially dangerous since its use for screening purposes may lead to treatment of "asymptomatic hyperuricemia" (15). In fact, unexpected pathologic values could cause unneeded repeated visits. Although urinalysis is not recommended as a screening test for reasons of cost-benefit, it continues to be frequently requested in primary care services (16). Finally, we studied tests that are rarely requested in primary care, but with an increasing utility such as markers for diagnosis of celiac and autoimmune diseases; conditions that are increasingly being diagnosed and treated in general practice. Lastly, we have studied the variability of two tests that are rarely requested, and have no or very marginal utility in this setting as ASO and protein electrophoresis.

It is difficult to define the optimal use of specific laboratory markers (3). However, when intervening in this type of benchmark studies, one must be aware when getting specific marginal results; i.e. if one's uric acid or urinalysis request rate is in the highest or lowest level. Moreover, information regarding the variability in the request of rare tests is very useful since they are usually much more expensive than the more demanded (17).

The value and significance of our study results and hence the applicability of the findings regarding differences in tests requesting patterns between laboratories are clear. Our results can be efficiently

used not only for discussions with local doctors on the appropriate use of laboratory tests (11), but also as a pillar for the design and establishment of strategies for a better request (17,18), even at a national level. The study has some limitations. First our data could not be transferred to other institutions with different Healthcare models, different to the public sector. Second, the differences observed could be due to differences in type or mix of patients treated by primary care in disease prevalence/incidence across departments or differences between poor and rich areas. Third, the differences in the requesting patterns could be also explained by the degree of management of the different diseases by GPs in the studied areas.

In all, the variability in the request of laboratory tests is inversely proportional to the request rate; this data can be used for discussions between laboratory professionals and GPs on the appropriate use of laboratory tests to improve test utilization and also can be the pillar for the design and establishment of strategies for a better test request.

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Potential conflict of interest

None declared.

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