Impact of a do-not-do intervention on 12 laboratory measurements

J. L. Zambrana-García[1], C. Macías Blanco[2], A. Fernández-Suárez[3,4], A. Peñacoba Masa[5], M. J. Olivares Durán[6], J. M. Aguilar Benítez[7,8], J. L. Zambrana-Luque[1]

[1] Coordinación Asistencial, Hospital de Montilla, Montilla, Córdoba, España.

[2] Línea de Biotecnología, Hospital de Montilla, Montilla, Córdoba, España.

[3] Línea de Biotecnología, Hospital Alto Guadalquivir, Andújar, Jaén, España.

[4] Línea de Biotecnología, Hospital Valle del Guadiato, Peñarroya, Córdoba, España.

[5] Área de Biotecnología, Hospital de Alta Resolución de Puente Genil, Puente Genil, Córdoba, España.

[6] Área de Biotecnología, Hospital de Alta Resolución Sierra de Segura, Puente Génave, Jaén, España.

[7] Área de Biotecnología, Hospital de Alta Resolución Alcalá la Real, Alcalá la Real, Jaén, España.

[8] Área de Biotecnología, Hospital de Alta Resolución Alcaudete, Alcaudete, Jaén, España.

Impacto de una intervención de «no hacer» en 12 determinaciones de laboratorio

Abstract

Objectives: In recent years, various scientific societies and healthcare organizations have created recommendations aimed at decreasing the use of healthcare interventions that have shown no efficacy or effectiveness. The aim of this study was to assess the impact of an intervention on 12 do-not-do recommendations regarding the laboratory in 7 hospital centers.

Methods: Before-after study conducted in 7 hospital centers of Cordoba and Jaen during 2015 and 2016. Based on the recommendations of existing scientific societies, a consensus was reached on various actions regarding laboratory measurements. We analyzed the number and cost of measuring 6 tumor markers (carcinoembryonic antigen, prostate-specific antigen, carbohydrate antigen [CA] 15.3, CA 125, CA 19.9 and alpha-fetoprotein), thyrotropin, T3, T4, glycated hemoglobin, urea, ferritin and antigliadin antibodies, before and after implementing the consensus.

Results: Compared with the previous year, there were 55,902 fewer laboratory measurements (–19%) in 2016, with an overall savings of € 82,100. The reduction in the number of measurements occurred mainly in plasma urea (–50.3%) and in the tumor markers CA 125 (–16%), CA 19.9 (–11.6%) and CA 15.3 (–10.5%). The most pronounced savings were achieved in the measurements of urea (–€ 21,002), thyroid hormones (–€ 12,716) and thyrotropin (–€ 7638).

Conclusions: The adoption and consensus of do-not-do recommendations among healthcare levels resulted in a significant reduction in unnecessary measurements.

Keywords: Patient safety; overuse; costs.

Resumen

Objetivos: En los últimos años distintas sociedades científicas y organizaciones sanitarias han generado recomendaciones orientadas a disminuir las intervenciones sanitarias que no han demostrado eficacia o efectividad. El objetivo de este estudio es evaluar el impacto de una intervención acerca de 12 recomendaciones de «no hacer» referidas al laboratorio en 7 centros hospitalarios.

Métodos: Estudio antes-después llevado a cabo en 7 centros hospitalarios de Córdoba y Jaén durante los años 2015 y 2016. Se consensuaron según las recomendaciones de las sociedades científicas existentes diferentes actuaciones referidas a determinaciones de laboratorio. Se analizaron el número y coste de las determinaciones de 6 marcadores tumorales [(antígeno carcinoembrionario, antígeno prostático específico, antígeno carbohidrato (CA) 15.3, CA 125, CA 19.9 y alfa-fetoproteína)], tirotropina, T3, T4, hemoglobina glicada, urea, ferritina y anticuerpos antigliadina, antes y después de la implantación del consenso.

Resultados: Se dejaron de hacer en el año 2016 respecto al año anterior 55.902 determinaciones de laboratorio (–19%), con un ahorro global de 82.100 €. La reducción en el número de determinaciones se produjo principalmente en la urea plasmática (–50,3%) y en los marcadores tumorales CA 125 (–16%), CA 19.9 (–11,6%) y CA 15.3 (–10,5%). El ahorro más acusado se obtuvo en la determinación de urea (–21.002 €), en la de hormonas tiroideas (–12.716 €) y tirotropina (–7.638 €).

Conclusiones: La adopción y consenso de recomendaciones de «no hacer» entre niveles asistenciales conlleva una reducción significativa de las determinaciones innecesarias.

Palabras clave: Seguridad del paciente; sobreutilización; costes.

Background

In April 2013, the Ministry of Health presented the initiative known as ‘‘Commitment to the Quality of Spanish Scientific Societies’’, whose main objective is to decrease the use of unnecessary healthcare interventions, defined as those that have not shown efficacy, have little or questionable effectiveness or priority or are not cost-effective. This project sought the collaboration and joint effort of Spanish scientific societies for the continuous improvement of the quality of healthcare. To this end, each society established 5 ‘‘do-not-do’’ recommendations based on a preliminary list of scientific, evidence-based recommendations obtained from clinical practice guidelines as the main source. The results so far are more than 140 recommendations proposed by 28 Spanish scientific societies. Approximately 20% of these recommendations refer to laboratory tests.1

Meanwhile, various societies have established a series of recommendations regarding the minimum intervals for repeating laboratory tests, based on the best current evidence and healthcare practices. One of the most common causes of inadequacy in laboratory measurements is the repetition of requests, which has been estimated at 16–30% of all tests performed.2,3

In overall terms, the impact of do-not-do recommendations on the daily conduct of health care is poorly known, and there are few studies on this topic.4 The main objective of this study was to assess the impact of an intervention on 12 do-not-do recommendations regarding the laboratory in 7 hospital centers.

Material and methods

Setting

The study was conducted in the 7 public hospitals managed by the Guadalquivir Healthcare Agency (Government of Andalusia), distributed in the provinces of Cordoba (Hospital of Montilla; High-resolution Hospital of Puente Genil; and High-resolution Hospital Valle del Guadiato, Peñarroya) and Jaen (Hospital Alto Guadalquivir, Andújar; High-resolution Hospital of Sierra de Segura, Puente Génave; High-resolution Hospital of Alcala la Real; and High-resolution Hospital of Alcaudete), which provide care for an estimated 252,000 individuals. The hospitals of Montilla and Alto Guadalquivir are regional hospitals, and the rest are of high-resolution hospitals. The difference between the 2 types of hospitals lies in the portfolio of services. The latter group is more limited because it does not provide conventional hospitalization, intensive care units or birthing care.

Design

This was a preintervention and postintervention study. In an initial phase, a multidisciplinary group was formed with physicians from the hospitals and from primary care (specialists in internal medicine, hematology, clinical analysis, emergency care and family and community medicine). This group selected the societies' do-not-do recommendations focused on laboratory measurements, following a nominal group technique. The selection of these laboratory tests was based on, among other aspects, the characteristics of the hospitals and their area of influence, the prevalence of the treated diseases, the specialties in the various hospitals and the ease of assessing the implemented changes. Likewise, the group used a consensus that determined the recommended intervals for repeating laboratory tests.2,3

The recommendations regarding the plasma measurements selected for the intervention were the following:

1. Thyroid hormones thyroxine-3 (T3) and thyroxine-4 (T4) measurements were only performed when thyrotropin (TSH) levels were altered (Spanish Association of Medical Biopathology).

2. A minimum period of 3 months between 2 consecutive measurements of glycated hemoglobin (HbA1c) will be maintained (Spanish Association of Medical Biopathology).

3. Serological tumor markers will not be requested as population screening (unless the population belongs to the defined risk groups for each type of tumor). The markers included in this group were prostate antigen, carcinoembryonic antigen (CEA), alpha-fetoprotein, carbohydrate antigens (AC) 19.9, CA 125 and CA 15.3 (Spanish Association of Medical Biopathology).

4. The detection of immunoglobulin A (IgA) and immunoglobulin G (IgG) antigliadin antibodies will not be used for diagnosing celiac disease (Spanish Society of Gastrointestinal Disease).

5. A minimum period of 2 months between 2 consecutive measurements of TSH will be maintained (Andalusian Society of Clinical Analysis).

6. A minimum period of 3 months between 2 consecutive measurements of ferritin will be maintained (Andalusian Society of Clinical Analysis).

7. Plasma urea concentrations will not be measured in those cases in which creatinine is simultaneously analyzed, except in cases of suspected gastrointestinal hemorrhage or when nitrogen metabolism needs to be calculated (recommendation raised by the constituted workgroup, considering the frequent request and questionable usefulness of this measurement if determined simultaneously with serum creatinine).5

Once the list was created, it was distributed by e-mail to the physicians along with a presentation in a clinical session by units and centers. Both measures explained what constituted the initiative ‘‘Commitment for Quality of the Scientific Societies’’ of the Ministry of Health, as well as the relationship of selected laboratory tests. A 2-month period was established for clarifications and claims that the staff considered necessary. This process ensured the dissemination of the project, a better understanding of the recommendations under analysis and increased support for practitioners. This initial phase lasted from October 1 to December 31, 2015.

Finally, a before-after study was designed to compare the number of measurements performed by our laboratories during 2015 versus the number performed during the same period in 2016. In addition, the cost of these measurements for both periods and the changes produced were analyzed. For the latter, the cost per relative unit of value for each test and center was employed through analytical accounting.

The data analysis was conducted using a descriptive study of the study population variables. The data are expressed in absolute figures of the measurements performed (total and broken down by test type) in both periods.

Results

Table 1 indicates the number of plasma readings performed in 2015 and 2016, as well as the reduction achieved in absolute numbers and percentages. In overall numbers, 55,902 fewer measurements were performed (−19% compared with 2015). This reduction occurred mainly in plasma urea (−50.3%) and tumor marker CA 125 (−16%).

Table 2 lists the unit cost for each test, the expenses generated in 2015 and 2016 and the savings. The reduction in expenditure was € 82,100 (−7.1%). This savings was mainly achieved by reducing the number of urea (savings of € 21,002) and thyroid hormones T3 and T4 (savings of € 12,716) readings.

Fig. 1 shows the reduction in the number of requests before and after the intervention. Each hospital had a different behavior; however, the reduction was more uniform in the regional hospitals (between −13% and −18%) and more disparate in the high-resolution hospitals (between −6% and −46%). There were no incidents or claims from staff or users regarding the implemented measures.

Discussion

This study shows that adopting do-not-do recommendations involves rationing laboratory measurements and expenditures. We have not found similar studies in the literature, except for one that focused exclusively on tumor markers.6 There could be various reasons for this lack of studies: the diversity of current recommendations and their recent publication, the various specialties involved, the unknown degree of penetration of these recommendations among medical personnel and the difficulty in measuring the implemented changes.7

The most noteworthy reduction in the number of measurements was for plasma urea, a result that was somewhat expected, given that there is an alternative reading (the one for creatinine) for determining renal function. However, there was not as significant a reduction in the request for tumor markers as that observed in other studies in our setting.6 This could be partly explained by the entrenchment that persists among practitioners on the usefulness of tumor markers as screening8 and by the lack of knowledge of the do-not-do recommendations. In a recent survey conducted by the Ministry of Health, almost 60% of those surveyed were unaware of the recommendations.9

It is apparent that the massive incorporation into clinical laboratories of electronic request systems, based on the electronic medical history or laboratory information system, has been a stimulus for the widespread use of tools for automated control of demand, which led our group to opt for implementing the do-not-do recommendations for laboratory tests. Through appropriate programming, we can exclude certain requests performed repeatedly over shorter time intervals than recommended. These measures have been shown to be particularly effective in reducing the number of unnecessary laboratory measurements.10,11 The measures include the automatic and irrevocable blocking of requested laboratory tests that are considered unnecessary; leaving the ultimate decision up to the discretion of the requesting physician once they have been warned of a repeated laboratory test; or a mixed system, as performed in this study, which consists of the automatic blocking of a measurement, if there was already a recent measurement. The measurement could ultimately be conducted if the requesting physician justified its necessity. The use of blocking requires less maintenance effort by the laboratory, and its effect is more sustained over time by not depending on environmental factors such as the relaxation of habits among requesting physicians or changes in the medical staff. Along with this, the flexibility of giving the requesting physician the last word in revoking the do-not-do order allows for specific exceptions to be made under necessary conditions, as occurs with TSH and glycated hemoglobin readings for pregnant women.

The elimination of unnecessary medical care and its optimization have received increasing attention by health systems in recent decades. In the United States, the ‘‘Choosing Wisely’’ movement emerged in 2012, whose main objective (more than reducing the cost of health care) was to provide greater value to medical care and reduce the potential risks to patients.12 The campaign’s central objective was to imbue healthcare with prudence, from both the practitioner’s and patient’s point of view. To this end, we need to change the culture of medical care that historically is accompanied by unnecessary additional tests, procedures and treatments.12,13 The culture is fed by patients’ expectations, the fear of allowing a possible diagnosis to slip by, the possibility of being accused of negligence, the training based on recommendations by reputable individuals and the desire to avoid telling patients that they do not need a specific test

or treatment.14,15 Avoiding repeated laboratory tests does not increase mortality or eliminate information that could be important for the patient's clinical diagnosis.16,17 Therefore, a reduction in the number of requested tests, provided it is performed reasonably, should not raise concern in terms of reduced quality in the provided care.

It is apparent that for the do-not-do culture to spread among practitioners and patients, we need to understand that ''more'' is not always better. To this end, communication between physicians and patients needs to be fluid. Physicians cannot do this alone; they need the involvement and understanding of patients and citizens. The success of this campaign can only be achieved with an educational effort targeted at patients and citizens that properly explains the initiative. Terms such as ''appropriate care'', ''preventing harm'' and ''smart decisions'' seem to appeal to practitioners and patients compared with terms such as ''resources'', ''savings'' and ''cost'', although this can differ from one country to another.4

The 3 most important limitations of this study are as follows: First, the degree of appropriateness of not conducting certain tests is unknown, although the fact that no incident related to the adopted measures was detected could be an indication that this difficulty is irrelevant. Second, given that this was a retrospective study, we could not analyze the changes in the number of requests for tests as a function of the petitioner's origin, because the name of the physician who requested the test was not recorded at the time the request was made. Lastly, by resorting to relative units of value to calculate the cost and savings of tests, we could not establish the actual savings, although we could provide an approximation of the costs.

In conclusion, reaching a consensus and implementing recommendations regarding unnecessary tests and treatments is feasible and reduces unnecessary expenditures. This initiative is also live and open and can incorporate new and varied recommendations in the future.

Conflicts of interest

The authors declare that they have no conflicts of interest.

References

1. García-Alegría J, Vázquez-Fernández Del Pozo S, Salcedo- Fernández F, García-Lechuz Moya JM, Andrés Zaragoza-Gaynor G, López-Orive M, et al. Compromiso por la Calidad de las Sociedades Científicas en España. Rev Clin Esp. 2017;217:212–21.

2. Estrategias para la gestión de la demanda analítica en el Laboratorio Clínico (I). Consideraciones sobre los intervalos mínimos de repetición de pruebas. Recomendaciones (2014) (Documento provisional. Versión 4). Sociedad Andaluza de Análisis Clínicos. Grupo de Trabajo de la Gestión de la demanda (GT1) [accessed 11.03.15]. Available in: http:// www.sanac.org/images/site/Grupos de trabajo/Documento GT1.pdf

3. Lang T. National minimum re-testing interval project: a final report detailing consensus recommendations for minimum re-testing intervals for use in clinical biochemistry. London: Association for Clinical Biochemistry and Laboratory Medicine; 2013 [accessed 16.07.14]. Available in: http://www.acb.org.uk/docs/default-source/guidelines/acbmri-recommendations-a4-computer.pdf

4. Rosenberg A, Agiro A, Gottlieb M, Barron J, Brady P, Liu Y, et al. Early trends among seven recommendations from the choosing wisely campaign. JAMA Intern Med. 2015;175:1913–20.

5. Alcázar R, Egocheaga MI, Orte L, Lobos JM, González Parra E, Álvarez-Guisasola F, et al. Documento de consenso SEN-semFYC sobre la enfermedad renal crónica. Nefrología. 2008;3:273–82.

6. Mérida de la Torre FJ, Moreno Campoy E, Martos Crespo F. Impacto de la aplicación de un protocolo para el uso adecuado y seguro de marcadores tumorales. Med Clin (Barc). 2015;145:526–8.

7. Levinson W, Kallewaard M, Sacha Bhatia R, Wolfson D, Shortt S, Kerr EA, et al. 'Choosing Wisely': a growing international campaign. BMJ Qual Saf. 2014;0:1–9.

8. Ferraro S, Mozzi R, Panteghini M. Tumor marker ordering: do not lose control: a prospective clinical trial. Am J Clin Pathol. 2015;144:649–58.

9. Zambrana-García JL, Lozano Rodríguez-Mancheño A. Actitudes de los médicos hacia el problema de las pruebas y los procedimientos innecesarios. Gac Sanit. 2016;30:485–6.

10. Korenstein D, Falk R, Howell EA, Bishop T, Keyhani S. Overuse of health care services in the United States: an understudied problem. Arch Intern Med. 2012;172:171–8.

11. Berwick DM, Hackbarth AD. Eliminating waste in US health care. JAMA. 2012;307:1513–6.

12. Cassel CK, Guest JA. Choosing wisely: helping physicians and patients make smart decisions about their care. JAMA. 2012;307:1801–2.

13. Keyhani S, Falk R, Howell EA, Bishop T, Korenstein D. Overuse and systems of care: a systematic review. Med Care. 2013;51:503–8.

14. Wolfson D, Santa J, Slass L. Engaging physicians and consumers in conversations about treatment overuse and waste: a short history of the choosing wisely campaign. Acad Med. 2014;89:990–5.

15. PerryUndem Research/Communication. Unnecessary tests and procedures in the health care system. What physicians say about the problem, the causes, and the solutions; 2014 [accessed 10.06.16]. Available in: http://www.choosingwisely.org/wpcontent/uploads/2015/04/Final-Choosing-Wisely-Survey- Report.pdf

16. Wachtel TJ, O'Sullivan P. Practice guidelines to reduce testing in the hospital. J Gen Intern Med. 1990;5:335–41.

17. Schifman RB. Quality assurance goals in clinical pathology. Arch Pathol Lab Med. 1990;114:1140–4.

Table 1. Laboratory measurements in 2015 and 2016

Table 1 Total number of laboratory measurements performed in 2015 and 2016, difference between the 2 years and percentage change.

Analytical parameter	No. of measurements in 2015	No. of measurements in 2016	Absolute difference 2015–2016	Percentage difference 2015–2016
HbA1c	24,425	23,760	665	−2.7
TSH (thyrotropin)	70,845	68,791	2054	−2.9
free T3-T4	19,440	17,301	2139	−11
Ferritin	46,017	45,699	318	−0.7
CEA	5539	5274	265	−4.8
PSA	16,512	15,794	718	−4.4
Alpha-fetoprotein	3399	3024	375	−11
CA 19.9	3450	3049	401	−11.6
CA 125	2975	2499	476	−16
CA 15.3	2764	2473	291	−10.5
Urea	95,629	47,490	48,139	−50.3
Antigliadin IgA-IgG Ab	1128	1068	60	−5.3
Total	292,123	236,221	55,902	−19

Abbreviations: Ab, antibodies; CA, carbohydrate antigen; CEA, carcinoembryonic antigen; HbA1c, glycated hemoglobin; Ig, immunoglobulin; PSA, prostate-specific antigen; T3, thyroxine-3; T4, thyroxine-4; TSH, thyrotropin.

Table 2. Costs and savings from laboratory measurements

Table 2 Total number of laboratory measurements performed in 2015 and 2016 and the resulting savings.

Analytical parameter	2015 Cost, euros	2016 Cost, euros	2015–2016 savings, euros	2015–2016 percentage difference
HbA1c	109,281	105,236	4045	−3.7
TSH	260,536	252,898	7638	−2.9
Free T3 and T4	102,302	89,586	12,716	−12.4
Ferritin	277,666	275,624	2042	−0.7
CEA	54,870	51,044	3826	−7.0
PSA	99,723	95,882	3841	−3.9
Alpha-fetoprotein	52,246	45,053	7193	−13.8
CA 19.9	50,455	44,347	6108	−12.1
CA 125	44,141	36,593	7548	−17.1
CA 15.3	16,502	14,409	2093	−12.7
Urea	42,740	21,738	21,002	−49.1
Antigliadin IgA-IgG Ab	43,330	39,282	4048	−9.3
Total	1,153,792	1,071,692	82,100	−7.1

Abbreviations: Ab, antibodies; CA, carbohydrate antigen; CEA, carcinoembryonic antigen; HbA1c, glycated hemoglobin; Ig, immunoglobulin; PSA, prostate-specific antigen; T3, thyroxine-3; T4, thyroxine-4; TSH, thyrotropin.

Figure 1. Percentage reduction in laboratory measurements by hospital

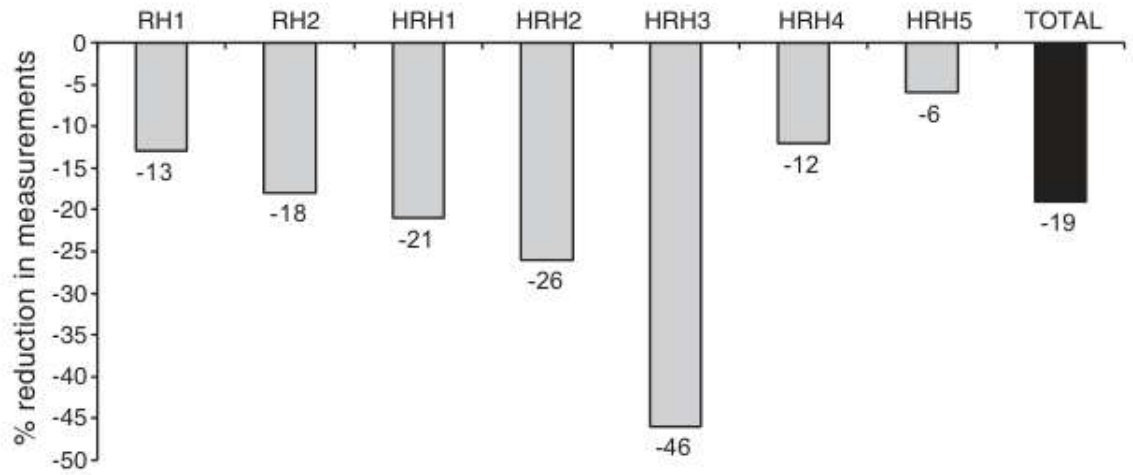


Figure 1 Percentage reduction in laboratory measurements (2015–2016) differentiated by hospital. *Abbreviations*: HRH, high-resolution hospital; RH, regional hospital.