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Does my patient really need this at admission? Seven opportunities for improving value in patient care during their hospitalization

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ABSTRACT

Introduction: Besides the main treatment for their disease, hospital patients receive multiple care measures which include venous lines (VL), urinary catheters (UC), dietary restrictions (DR), mandatory bed rest (BR), deep venous thrombosis prophylaxis (VTP), stress ulcer prophylaxis (SUP) and anticoagulation bridge therapy for atrial fibrillation (BAF). In many cases these practices are of low value.

Methods: We analysed patients admitted to Internal Medicine wards throughout 2018 (2714 inpatients). We used different methodologies to identify low-value clinical practices.

Results: BR or DR at admission were recommended in 37% (32–44) and 24% (19–30) of the patients respectively. In 81% (71–87) and 33% (21–45) of the cases this restriction was deemed unnecessary. Ninety-six percent (92–98) had VL and 25% (19–32) UC. VL were not used in 10% (6–12), UC had no indications for insertion in 21% (11–35) and for maintenance in 31% (12–46) patients. Fifty-seven percent (49–64) of the patients were administered VTP and 69% (62–76) were prescribed SUP. Twenty-two percent (15–31) of patients with VTP and 52% (43–60) with SUP had no indication. Chronic anticoagulation for AF was interrupted in 65% (53–75) with BAF was prescribed in 38% (25–52) of them.

An intervention to reduce low-value care supporting clinical practices addressed only to the Internal Medicine Wards showed very poor results.

Conclusion: These results demonstrate that there is ample room for reduction of low-value care. Interventions to implement clinical guidelines at admissions should be addressed to cover the entire admission process, from the emergency room to the ward. Partial approaches are discouraged.

1. Introduction

Initiatives such as Choosing Wisely [1], JAMA updates on medical overuse [2,3], UK's National Institute for Health and Care Excellence do-not-do list [4] or Too Much Medicine [5], among others, have raised awareness of health professionals, health managers and patients about low-value care and the harms and expenses associated with medical excess. The Choosing Wisely campaign has highlighted several tests and

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Table 1
Guidelines for supporting clinical practices.

Procedure at admission	Guidelines	Ref
Mandatory bed rest (Bed restriction)	Mandatory bed rest should be recommended for patients with trauma or surgery that requires immobilization. Mandatory bed rest should be considered for patients with dyspnoea at rest, too sick to be up, unconscious, or when it is unsafe to be up without the assistance of staff or care giver. Early ambulation should be recommended for patients with pulmonary embolism, deep vein thrombosis or in patients with lumbar pain.	[14,15]
No food or liquids by mouth/Nil per os (Dietary restriction)	No food or liquids by mouth should be recommended for unconscious patients, swallowing difficulties, intestinal ileus (post-surgery, ischemic, obstructive, etc), or when needed for a diagnostic test or treatment.	[16]
Venous line placement	Venous lines should be placed when needed for intravenous treatment administration, fluid replacement or for diagnostic tests.	[17,18]
Urinary catheter placement	Urinary catheters should be placed according to HOUDINI Indications for indwelling urethral catheter use.	[19]
Deep venous thrombosis prophylaxis	Deep venous thrombosis prophylaxis should be indicated according to the PADUA prediction score (medical hospitalized patients) or the CAPRINI Risk Assessment model (surgical hospitalized patients) after assessment of bleeding risk by the IMPROVE bleeding Risk Score.	[20,24,25]
Stress ulcer prophylaxis	GASA should be indicated during admission for: a) Patients with long-term indication for GASA due to prior GI bleed, Barret's oesophagus, maintenance of symptoms control in Gastroesophageal reflux disease, pathological hypersecretory condition (eg. Zollinger-Ellison syndrome), severe esophagitis or ongoing NSAID use or dual antiplatelet therapy. b) Patients with short-term indication for GASA for current peptic ulcer disease, upper GI symptoms or *H. pylori* treatment. c) Patients with indication for stress ulcer prophylaxis during admission: 1. Patients with coagulopathy 2. mechanical ventilation for > 48 h 3. history of gastrointestinal ulceration or bleeding within one year of admission 4. thermal injury to > 35% of body surface area or spinal cord injury 5. with two or more of the following 4 risk factors: a) ICU stay > 7 days, b) occult bleeding lasting at least six days, c) high dose glucocorticoids (> 50 mg methylprednisolone/24 h) or d) aspirin or NSAIDs during admission.	[21–23]
Anticoagulation bridge therapy for atrial fibrillation	Generally bridge therapy should be indicated only for patients with high thrombotic risk*. Previously bleeding risk should be assessed. *High risk is considered for: CHA2DS2-VASC ≥ 7, prior TE within 3 months, CHA2DS2-VASC 5-6 plus prior TE > 3 months prior, auricular thrombus, severe mitral stenosis or mechanical heart valve prosthesis	[26]

GASA: Gastric acid-suppressive agents; GERD gastro-oesophageal reflux disease; NSAID: non-steroidal anti-inflammatory drugs, TE: Thromboembolic event.

interventions that should be questioned by the publication of a “Top 5” list, according to different medical specialities [6]. These lists show which interventions are not expected to provide a net benefit for our patients, and can even cause net harm, which is defined as low-value care.

Despite these campaigns, low-value care remains one of the most important problems in healthcare as it leads to iatrogenic patient harm, delays and interferences with the delivery of high-value care, in addition to raising costs at a time when the increase in costs threatens the sustainability of the healthcare system [7]. This problem affects the different healthcare systems across the world regardless of whether they are fee-for-service or globally-budgeted healthcare systems [8]. Low-value services remain a difficult problem to deal with due to the wide array of interrelated factors involved: clinician training, time pressure, fear of lawsuits, intolerance of uncertainty, institutional culture and tradition, or unrealistic expectations of patients. As expected, multicomponent interventions seem to be more effective than single-component interventions in reducing low-value care [9].

One of the limitations when it comes to raising awareness among health professionals is that most of the studies on low value care are focused in the overuse of treatments, procedures or techniques [6,10–12] which are the key element to address the patient's consultation, while side clinical practices, that serve as support to the main procedures, are disesteemed. We should be aware of the magnitude of the overuse of supporting clinical practices such as excessive testing of inpatients by daily blood draws, overnight vitals or continuous telemetry [13]. Several daily clinical practices performed during hospitalization like dietary or physical activity restrictions, use of prophylaxes or placement of catheters seem to be carried out by inertia without having a clear objective or reason that justifies them. Guidelines have been published for most of these supporting clinical practices [14–26], however, we do not know their degree of application in real practice.

In this manuscript, we try to present an accurate picture of the actual implementation of these recommendations for supporting clinical practices in our area. In addition, we submit the poor results obtained from an initiative carried out in our area to try and rationalize these supporting clinical practices. The intervention, which was addressed only to the Internal Medicine wards within the entire Hospital, resulted in a modest reduction of some of the low-value practices, while in others no reduction was observed.

2. Methods

2.1. Setting

Our hospital is a 408-bed tertiary care teaching hospital. The hospital has been recognized as the reference Hospital for the El Bierzo area, in the province of Leon, in the north west of Spain. We serve a local population of 136,000 people. The Internal Medicine Service includes 2 Wards with a total of 78 beds and attended 2714 inpatients during 2018. Data on Diagnosis-Related Group (DRG), gender, age, average length of stay and percentage of death for All Patient Refined-DRG are detailed as supplementary material.

2.2. Low-value care supporting clinical practices identified

As part of a quality improvement process called “if it is not necessary, it can harm”, we analysed the entire process of admission of a patient to our hospital. We tried to identify those supporting clinical practices performed for most patients that could have been overused or carried out routinely without following a protocol. Finally, we selected seven supporting clinical practices to be analysed:

i. Two restrictions: mandatory bed rest (BR) and dietary restriction – nil per os (DR).
ii. Three prophylaxes: deep venous thrombosis prophylaxis (VTP),

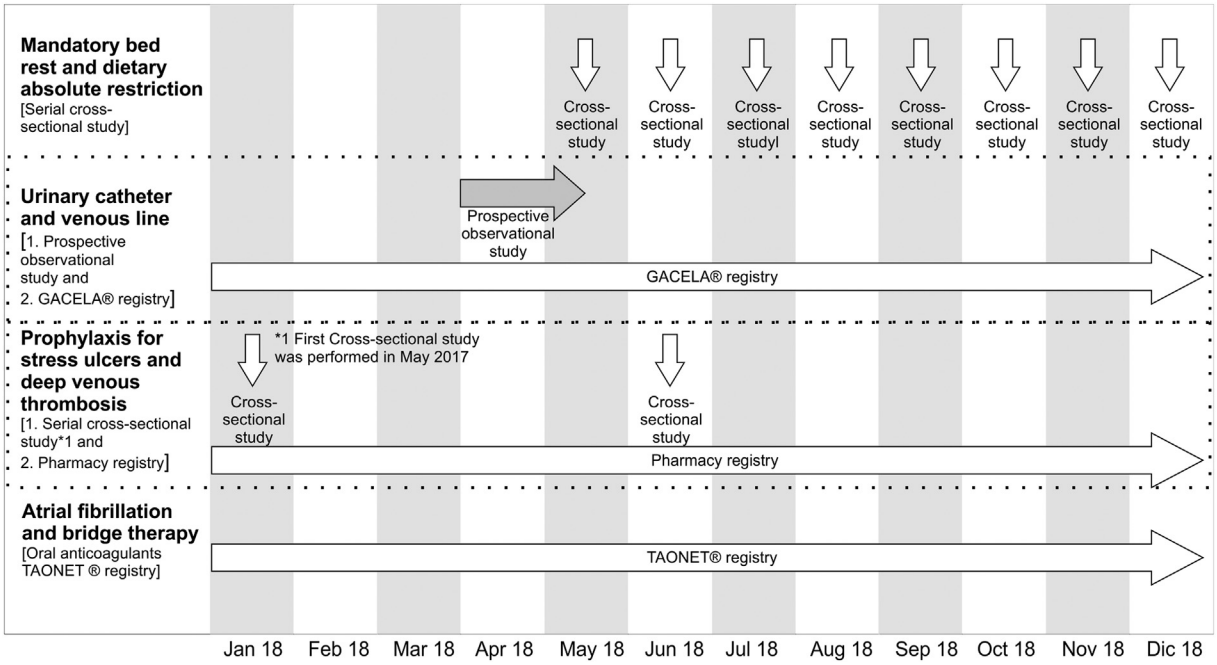

Fig. 1. Summary of the studies used to assess supporting clinical practice prevalence.

stress ulcer prophylaxis (SUP) and anticoagulation bridge therapy for atrial fibrillation (BAF).

iii. Two care devices: venous lines (VL) and urinary catheters (UC).

Guidelines for every one of the seven supporting clinical practices are detailed in Table 1.

2.3. Assessment of prevalence of low-value care supporting clinical practices

We used different designs to assess the prevalence of low-value care practices. Prospective or serial cross-sectional studies were used when there was a need to analyse not only the quantity but the quality of the different recommendations, while database analysis was used to follow the quantity of every recommendation. Detailed description of the different methods used in this study are detailed in Fig. 1 and over the next paragraphs.

Ward nurse supervisors collected data prospectively one day per month on bed and dietary restrictions from May 2018 to December 2018.The prevalence rate of bed and dietary restriction was defined as the number of patients with restriction/total number of inpatients x 100. To assess if the restriction recommendation had been properly instructed or if, contrarily, it was considered a low-value care practice, one of the researchers (L C-G) assessed the recommendation according diagnosis at admission.

We collected urinary catheter and venous line use in the Internal Medicine Wards from January 2018 to December 2018. Monthly prevalence was obtained using GACELA (Gestion Asistencial de Cuidados de Enfermeria en Línea)® nurse care database. The urinary catheter and venous line prevalence rates were defined as the number of patients with catheters or venous lines respectively divided by the total number of inpatients x 100. Unit-specific prevalence rates were also calculated. To assess the quality of the urinary catheter or venous line insertion orders we performed a 45-day prospective study from April to May 2018. All the patients admitted to the Internal Medicine Ward were invited to participate in the observational study. Patients with urinary catheters or venous line were followed during hospital admission and one month after discharge, by an additional telephone call, to collect data on any complications during and post-hospitalization.

We collected data on low molecular weight heparins (LMWH) and gastric acid-suppressive agents' (GASA) consumption during admission from August 2017 to October 2018. Prevalence for the first Tuesday of each month was obtained from the Hospital El Bierzo Pharmacy database. Unit-specific LMWH and GASA consumption prevalence rates were calculated. The LMWH or GASA prevalence rates were defined as the number of patients taking LMWH or GASA respectively divided by number of patients x 100. To assess the quality of LMWH or GASA medical prescription during admission we performed three cross sectional studies which included all the inpatients in Medical Internal Ward during a specific day. All the inpatients in the Internal Medicine Wards were invited to participate. This allowed us to analyse the appropriateness of GASA or LMWH prescriptions at home and during admission.

We collected data on anticoagulation bridge therapy in patients with AF by using TAONet® (Roche diagnostics) database. We recorded data from patients on warfarin or acenocoumarin. The prevalence rate of patients with bridge therapy was calculated and defined as the number of patients with bridge therapy divided by the number of patients who have their anticoagulant treatment stopped during admission x 100. Patients with direct oral anticoagulants were not included as they are not recorded in TAONet® database.

2.4. The interventions to reduce low-value care supporting clinical practices

Our second objective was to reduce the low-value care interventions. To achieve this objective, we performed three clinical sessions in April 2018 with clinicians and nurses from the Internal Medicine Wards. The clinical sessions were focused on the seven recommendations. To make the seven recommendations easier to remember they were printed on the tablecloths from the staff cafeteria from May to December 2018. We encouraged clinical teams to incorporate the assessment of bed rest recommendations, dietary restrictions, urinary catheter and venous line necessity into their daily multidisciplinary clinical rounds.

Additional interventions were performed for urinary catheters. Nurses from Internal Medicine Wards were educated on appropriate urinary catheter placement indications and provided with portable bladder ultrasound devices and alternatives to catheter use.

Between January 2018 and March 2018 no interventions were

carried out. This period is considered as the basal period.

2.5. Ethical approval

The study was approved by our Clinical Research Ethics Committees: Leon Clinical Research Ethic Committee, research project number 1768, 24th April 2017. Written informed consents were obtained from each of the patients for the prospective study on UC and VL and for the cross-sectional studies on GASA and LMWH use. Patients records were meticulously anonymized according Research Ethic Committee recommendations.

2.6. Statistical analysis

Basic statistical analyses were done using Excel Office 365 and IBM SPSS Statistics 21.0. We calculated prevalence rates and their 95% confidence interval. Changes in urinary catheter and venous line use and GASA or LMWH consumption before and after the intervention (January–March 2018 preintervention period vs. May–December 2018 postintervention period) were assessed using Chi Square test. The null hypothesis was that there were no differences between preintervention period and postintervention period. Data from April 2018 was not used since clinical sessions were performed during this month.

3. Results

3.1. Prevalence of supporting clinical practices

The design, sample characteristics and main objectives of the different studies are detailed in Table 2. The prevalence of the supporting clinical practices is shown in Fig. 2. The percentage of these supporting clinical practices that were considered as low-value care ranges from 10% of VL to 81% of BR. For UC, in addition to the percentage of inpatients with a low-value care indication for UC insertion, an additional 31% (95% IC 12–46%) was considered to have a low-value care indication as a result of maintaining the UC when it was not necessary. Most of the low-value care indications for UC arose as a result of using them to measure input and output when this measurement was not critical for patient management. Thirteen percent (95% IC 6–27) of the patients that had a UC inserted during admission were discharged with it.

GASA and anticoagulation use at home conditioned SUP and DVP rates. Two thirds of the patients were taking regularly GASA at home. Only 21% of them had an accepted indication for chronic use of GASA: history of gastrointestinal bleeding ulcer (10%), chronic use of non-steroidal anti-inflammatory drugs (NSAID) (4%), severe esophagitis (3%), gastrointestinal reflux in treatment (3%), Barrett's oesophagus (1%). One in every four patients was on anticoagulation therapy for AF, heart valve replacement or pulmonary embolism prior to admission.

VL and UC were frequently associated with complications. Nine percent (95% IC 6–15) of patients with VL suffered extravasation of fluid, 21% (95% IC 16–29) experienced accidental loss of the VL and 11% (95% IC 7–17) developed phlebitis. Eight percent (95% IC 3–20) of patients with UC developed symptomatic urinary tract infection. The longer the VL or UC remained inserted, the greater the risk of developing infection. The median days of VL use was of 15 ± 15 for patients who developed phlebitis vs. 10 ± 8 for the patients without phlebitis ($p = .044$). The median days of UC use was 27 ± 21 days for patients who developed symptomatic urinary tract infection vs. 8 ± 10 days for patients without infection ($p = .008$). In our series, no patient with less than five days of VL or UC developed phlebitis or urinary infection: NNT 7 (95% IC 5–26) and 8 (95% IC 3–20) respectively.

3.2. Changes in prevalence after educational intervention

GASA and LMWH consumption, % of patients with UC and number of VL for patients were monitored over 2018 before and after educational the intervention to reduce low-value care (see Fig. 3). There was no reduction in GASA consumption (66.0% vs. 62.3%, $p = .268$). There was a statistically significant reduction in LMWH consumption in the first five months after the educational intervention (66.7% vs. 50.6%, $p < .001$), although this reduction was lost over the last months of 2018. There were no reductions in UC (29.4% rate vs. 31.8%, $p = .342$) or VL (2.62 VL for patients vs. 2.41, $p = .192$) use before and after the intervention. Two Internal Medicine Wards were monitored, one of which was provided with a bladder scan after educational intervention. There was a reduction in the number of UC inserted during hospitalization in the ward with bladder scan (from 15% to 8% $p = .043$), while no reduction was observed in the ward without bladder scan (12% vs. 12% $p = .739$).

4. Discussion

This manuscript describes the prevalence of some supporting clinical practices and the rate in which these practices are of low-value care. In addition, we show the poor results of an educational intervention to reduce unnecessary supporting clinical practices addressed exclusively to the internal wards.

Our data on overuse of prophylaxis are similar to the figures described in other series. The mean rate of inappropriate use of GASA in general medical wards is 57% in Savarino et al.'s review [27] and the overuse of thromboprophylaxis in an Italian cohort was 16.5% [28]. The inappropriateness of GASA prescription at home in our series was even higher than the 50% mean rate described in Savarino's review

Table 2
Study design, sample characteristic and main objectives.

Study design (objective)	Period	Characteristic	Main objectives
Serial Cross-Sectional studies	20th May 2017 30th Jan 2018 13th Jun 2018	n:182% males: 51% Age: 84 (76–88)	Assessment prevalence of VTP and SUP Assessment of the quality of GASA and LMWH indication
Prospective Observational study	From 1st April 2018 to 15th May 2018	n:156% males: 48% Age: 85 (80–89) % death: 9% % dementia: 30% %LUTS-BPH:36%*1	Assessment prevalence of VL and UC Assessment of the quality of VL and UC indications Assessment complications related with VL and UC use
Serial Cross-Sectional studies	One day in the first week of May to December 2018	n:235	Assessment prevalence of BR and DR Assessment of the quality of BR and DR indication
Database analysis (Assessment of BAF)	Across 2018.	n:150	Assessment prevalence of anticoagulation stop during admission and bridge therapy

*1 percentage from males.

BPH: Benign prostatic hyperplasia, CAUTI: Catheter associated Urinary Tract Infection: GASA: Gastric Acid-Suppressive Agents, LMWH: Low Molecular Weight Heparin, LUTS: Lower urinary tract symptoms, UC: Urinary Catheter, VL: Venous Line.

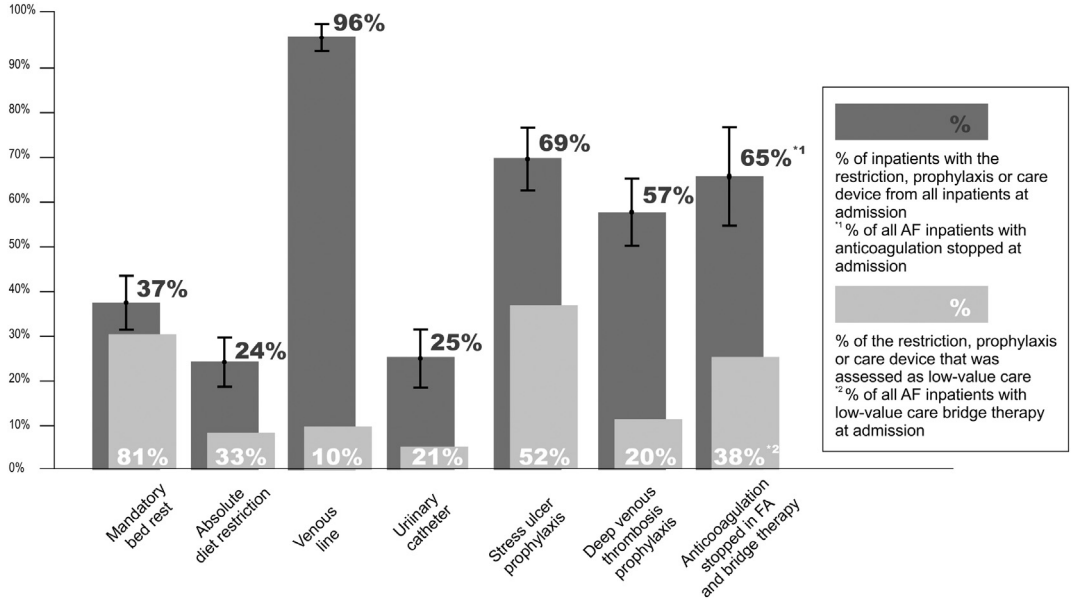

Fig. 2. Prevalence of supporting clinical practices and percentage of low-value care.

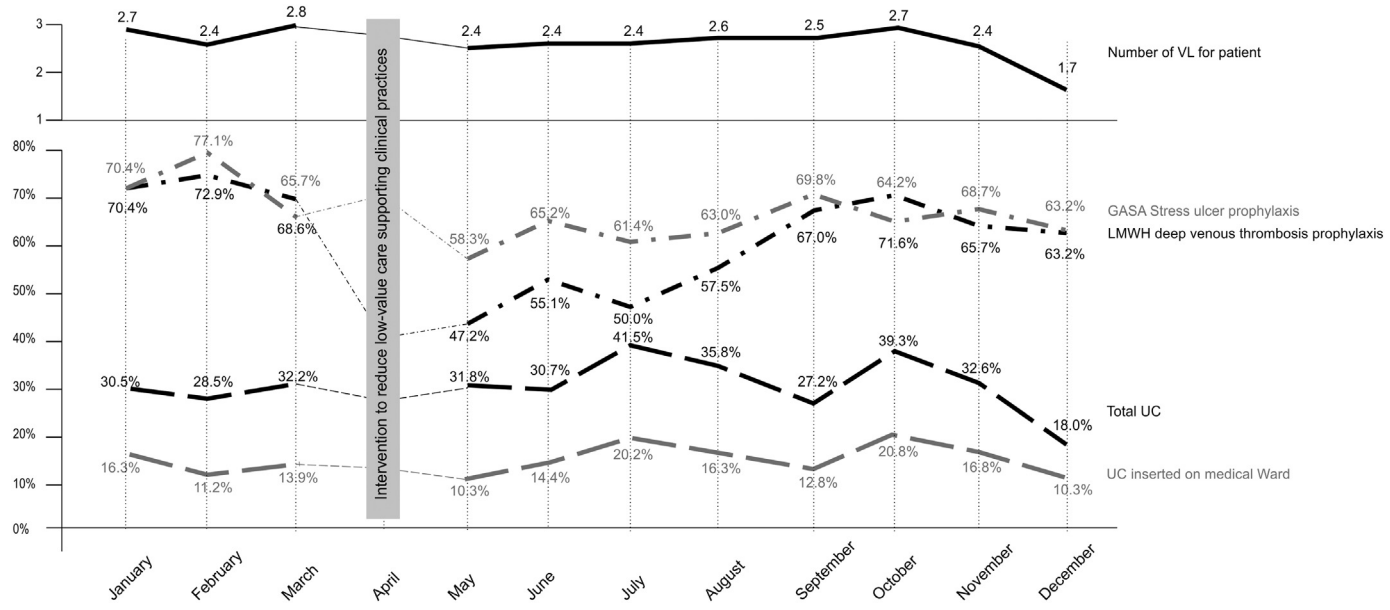

Fig. 3. Monitoring of supporting clinical practices across 2018.

[27], probably due to the high mean age of our population. Our data on bridge therapy is also similar to that observed in previously published papers, 30.6% in Clark et al.'s cohort [29]. In the same way, our data on overuse of UC approximates that observed in existing literature, 21–54% of patients with unjustified insertion of UC and 47% of UC without an indication for maintenance [30–33]. We were not able to find any manuscripts on the appropriateness of venous line indications. However, the high percentage of clinicians that are unaware of the presence of, not only peripheral, but central venous catheters in their patients (21.2%) [34] and the fact that as many as 25.2% of central venous catheter days are idle [35], gives us a rough idea of the number of venous lines that should not be prescribed and those that are maintained without a clear justification. Lastly, to the best of our knowledge, there are no manuscripts dedicated to the assessment of the appropriateness of mandatory bed rest or nil per os dietary restrictions in inpatients. The percentage of patients that were prescribed mandatory bed rest is similar to the 31–36% described in the surveys carried out by Ehrlich et al. [36].

The second objective of our study was to present the results of our educational intervention to reduce inappropriate supporting clinical practices. Unlike results observed in interventions carried out by other authors, where positive results were achieved with the reduction of UC use [37], our intervention only achieved partial and not maintained improvements. There were several reasons for the poor success of our educational interventions. The major weakness of our intervention was that it was addressed only to the internal medicine ward. With this approach, we were neither considering the stay of our patients in other departments, like the Emergency Department where most of the UC or VL are inserted, nor the weight of home medication such as GASA in the hospital prescription of our patients. Taking this into account, it is not surprising that the only two recommendations that were followed by a reduction in number of their prescriptions were the use of LMWH as prophylaxis, because unlike GASA, these have no role in home medication, and the reduction of UC placed in the ward itself, but not the in

total number of UC. In addition, the unsustained reduction of LMWH prescription in the last months of 2018 could be the after effect of the absence of educational interventions to reinforce the message of the campaign after April 2018. In the same way, we only performed one clinical meeting to share the outcomes of our study during the course of the investigation. Furthermore, the incorporation to ward rounds of checklist with the seven recommendations was proposed as tool to improve the adoption of the seven recommendations but it was finally not undertaken. Finally, the use of electronic devices such as a portable bladder scanner was not generalised throughout the ward with a consequent limitation of its value.

Our study has limitations. First, we used different methodologies to assess the different figures of prevalence instead of performing a unique prospective study. The reason for this choice was the difficulty to address seven outcomes with a unique study design and our intention to involve different health professional groups (clinicians, nurse supervisor, nurses) in the study as data collectors in order to increase their awareness of the magnitude of the problem. Secondly, we only associated the lack of appropriate supporting clinical practices to adverse outcomes for UC and VL. In the case of DVP and SUP we only obtained partial data as there were neither deep venous thrombosis episodes nor stress ulcers diagnosed after admission during the study period. By the same token, we did not record the rates of bleeding among patients with VTP, nor data on recurrent venous thromboembolism among patients who required temporary interruption of anticoagulant therapy, nor adverse events associated with BR or DR. Thirdly, our design of the educational intervention was clearly insufficient as we analysed in the previous paragraph. Fourthly, we did not evaluate the effect of the measures taken during hospitalization on the prescriptions adopted by the general practitioners after patient discharge and if there was a reduction of inappropriate drug use such as GASA. Finally, our study includes only one academic hospital, reducing the degree of external validity of our findings. Additionally, some of the computer registries used are locally designed, which can reduce their applicability in other settings.

Notwithstanding these limitations, our study has important strengths. First, to our knowledge this is the first study that includes the seven clinical practices in the same manuscript, giving a very complete picture of the magnitude of the problem of unnecessary supporting clinical practices. Second, we believe that our figures are quite realistic as we determined the prevalence of the different supporting clinical practices at multiple points in time, and in some cases, continuous monitorization. Thirdly, we find of importance to share the negative results of our educational intervention as the lessons learned with our failure can serve other health institutions to design their action plans. After analysing our results, we propose the following four key points to consider when designing such interventions: 1) interventions ought to be coordinated and implemented throughout the entire admission process regardless of where the patient is attended, 2) interventions should be kept in time. To achieve this objective, we could use different educational formats such as, among others, clinical sessions, reminders or computer applications, 3) recommendations should be incorporated to the daily routine and should be part of the ward rounds in the form of clinical checklists, 4) unit teams and staff should be aware of the evolution of the usage rates of their clinical practices.

What can we do to achieve the best clinical care? We need to question every practice, not only the most important decisions like the choice of antibiotics or the selection of a surgical technique, but also those medical procedures, care issues and recommendations with less impact on the prognosis of our patient. We need to know what evidence there is behind every one of our procedures, treatments, restrictions or recommendations. If there is no evidence, we should stop carrying them out and avoid unnecessary discomfort to our patients and extra work imposed upon the hospital care teams. To address the effectiveness of our interventions we should establish a ratio between the risks and benefits, since narrowing our analysis to complications without taking into account their potential benefits would be limiting and incorrect. Guidelines should be implemented at admission, not only for major issues and index diseases, but for all the decisions related with patient care. Our study suggests that relying on clinicians and nurse teams' awareness of the problem may not be enough to achieve these objectives. Rather, multidisciplinary approaches seem necessary.

In conclusion, we found that too many supporting clinical practices are prescribed without a clear justification in our daily work. Policies and guidelines to deal with the overuse of treatments, recommendations and urinary catheters or venous lines should be warranted. Further studies on the best interventional designs and their impact to modify the habits of health professionals and transform clinical traditions into evidence-based practices are needed.

Authors' contributions

Dr. Corral-Gudino had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

1a. Substantial contributions to study conception and design: Corral-Gudino, Luis; Ortega-Gil, Martín, Bahamonde-Carrasco, Alberto.

1b. Substantial contributions to acquisition of data: Performed the observational prospective study and the serial cross-sectional studies: González-Fernández, Ana; Rivas Lamazares, Alicia; Tierra-Gonzalez, Ana; Runza-Buznego, Paula and Hernández-Martín, Ester. Recorded data from Pharmacy database: Rodriguez-María, Miriam. Recorded data from TAONet®: Aguilera-Sanz, Carmen. Recorded data from GACELA® database and coordinated ward nurse supervisor cross-sectional study: Ortega-Gil, Martín.

1c. Substantial contributions to analysis and interpretation of data: Corral-Gudino, Luis.

2. Drafting the article or revisingit critically for important intellectual content: Corral-Gudino, Luis; González-Fernández, Ana; Rivas Lamazares, Alicia; Tierra-Gonzalez, Ana; Runza-Buznego, Paula; Hernández-Martín, Ester; Rodriguez-María, Miriam; Aguilera-Sanz, Carmen; Bahamonde-Carrasco, Alberto and Ortega-Gil, Martín.

3. Final approval of the version of the article to be published: Corral-Gudino, Luis; González-Fernández, Ana; Rivas Lamazares, Alicia; Tierra-Gonzalez, Ana; Runza-Buznego, Paula; Hernández-Martín, Ester; Rodriguez-María, Miriam; Aguilera-Sanz, Carmen; Bahamonde-Carrasco, Alberto and Ortega-Gil, Martín.

Declarations of interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ejim.2019.06.007.

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