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Economic burden of skin and skin structure infections due to Gram-positive bacteria in patients on hospital at home-based outpatient parenteral antibiotic therapy (OPAT)

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ABSTRACT

Objective. To describe and quantify resource use and direct health costs associated with skin and skin structure infections (SSSIs) caused by Gram-positive bacteria in adults receiving outpatient parenteral antimicrobial therapy (OPAT), administered by Hospital at Home units (HaH) in Spain.

Material and methods. Observational, multicenter, retrospective study. We included patients of both sexes included in the HaH-based OPAT Registry during 2011 to 2017 who were hospitalized due to SSSIs caused by Gram-positive bacteria. Resource use included home visits (nurses and physician), emergency room visits, conventional hospitalization stay, HaH stay and antibiotic treatment. Costs were quantified by multiplying the natural units of the resources by the corresponding unit cost. All costs were updated to 2019 euros.

Results. We included 194 episodes in 189 patients from 24 Spanish hospitals. The most frequent main diagnoses were cellulitis (26.8%) and surgical wound infection (24.2%), and 94% of episodes resulted in clinical improvement or cure after treatment. The median HaH stay was 13 days (interquartile range [IR]:8-22.7), and the conventional hospitalization stay was 5 days (IR: 1-10.7). The mean total cost attributable to the complete infectious process was €7,326 (95% confidence interval: €6,316-€8,416).

Conclusions. Our results suggest that OPAT administered by HaH is a safe and efficient alternative for the management of these infections and could lead to lower costs compared with hospital admission.

Keywords: Hospital at home, outpatient parenteral antimicrobial therapy (OPAT), cost analysis, skin and skin structure infections (SSSIs)

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Carga económica de la infección de piel y partes blandas por microorganismos grampositivos en pacientes en unidades de hospitalización a domicilio con tratamiento antimicrobiano domiciliario endovenoso (TADE)

Objetivo. Describir y cuantificar el uso de recursos y costes directos sanitarios asociados con las infecciones de piel y tejidos blandos (IPPB) causadas por microorganismos grampositivos en adultos que recibieron tratamiento antimicrobiano domiciliario endovenoso (TADE), administrado en unidades de hospitalización a domicilio (HaD) en España.

Material y métodos. Estudio observacional, multicéntrico, retrospectivo. Se incluyeron pacientes adultos de ambos sexos, incluidos en el Registro TADE en el periodo 2011 a 2017 y cuyo motivo de ingreso fue una IPPB causada por un microorganismo Grampositivo. El uso de recursos incluyó las visitas a domicilio (enfermería y médico), visitas a urgencias, estancia en hospitalización convencional, estancia en HaD y tratamiento antibiótico. Los costes se cuantificaron multiplicando las unidades naturales de los recursos por el coste unitario correspondiente. Todos los costes fueron actualizados a euros de 2019.

Resultados. Se incluyeron 194 episodios (189 pacientes) procedentes de 24 centros españoles. Los diagnósticos principales más frecuentes fueron celulitis (26,8%) e infección por herida quirúrgica (24,2%). El 94% de los episodios resultaron en una mejoría o curación clínica al finalizar el tratamiento. La mediana de la estancia en HaD fue de 13 días (rango intercuar-

tílico [RI]:8-22,7), con una estancia previa en hospitalización convencional de 5 días (RI: 1-10,7). El coste total promedio atribuible al proceso infecciosos completo fue de 7.326€ (intervalo de confianza del 95%: 6.316€-8.416€).

Conclusiones. Este estudio sugiere que el TADE administrado en HaD es una alternativa segura y eficiente para el manejo de estas infecciones y podría conducir a menores costes en comparación con el ingreso hospitalario.

Palabras clave: TADE, análisis de costes, infecciones de piel y tejidos blandos

INTRODUCTION

Bacterial skin and skin structure infections (BSSSI) encompass infections that affect the skin, skin appendages, subcutaneous cell tissue, fascia, and skeletal muscle [1]. Patients with complicated BSSSI may present with cellulitis/erysipelas (characterized by redness, edema, and/or induration that spreads), wound infections (including surgical site infections), and major skin abscesses [2].

In Spain, skin and skin structure infections (SSSIs) are the fourth most frequent nosocomial infections, according to the EPINE report (Sociedad Española de Medicina Preventiva Salud Pública e Higiene, 2019) and are a frequent reason for consultation in outpatient and hospital settings [3]. The prevalence of SSSIs was found to be 1.6% in Spain, representing 11% (1250 cases) of all emergency service consultations for infection [4].

Although the etiology of SSSIs may include viruses, parasites, bacteria, and fungi some of them as part of the saprophytic flora of the skin and mucous membranes, infections by bacteria are the most frequent, especially those due to Gram-positive bacteria. The most prevalent microorganism is *Staphylococcus aureus,* and its treatment has been complicated by the increase in methicillin-resistant strains [5].

A European study found that antimicrobial treatment did not achieve a clinical cure in 46.6% of complicated SSSIs episodes [6], which may lead to increased mortality in cases of severe sepsis and septic shock in addition [7] to a greater economic cost [8]. Antimicrobial treatment of SSSIs is conditioned by the microorganisms that colonize the skin of the affected area, the acquisition site of the infection, the clinical presentation, risk factors, prior administration of antibiotics, and the local epidemiology of microbial resistance [9].

Hospital at Home (HaH) is an alternative to hospitalization for some patients, which provides levels of care similar to those provided by hospitals [10]. HaH may include outpatient parenteral antimicrobial treatment (OPAT), which consists of the treatment of infectious disease at home, including parenteral administration of the antimicrobial and clinical and analytical controls that indicate the disease evolution [11]. OPAT programs have proven to be an effective and safe alternative to hospitalisation in the treatment of complex infections [12]. HaH has been increasingly used in Spain in recent years [13–15].

The objective of this study was to describe and quantify resource use and direct health costs associated with SSSIs caused by Gram-positive microorganisms in adults receiving OPAT administered in HaH units in Spain.

METHODS

Study design and population. An observational, multicenter, retrospective pharmacoeconomic evaluation was conducted. The study data come from the HaH-based OPAT Registry, a database with hospital records of patients receiving parenteral treatment at home from the HaH unit of the participating centers [16]. The study was classified by the Spanish Agency for Medicines and Health Products (AEMPS) as a Post-Authorisation – Other Designs (EPA-OD) and was approved by the Research Ethics Committee of the Alcorcón Foundation University Hospital.

The study was carried out by analyzing hospitalizations attended by HaH units of the participating centers of the HaH-based OPAT Registry between 2011 and 2017. The economic evaluation was carried out from the perspective of the Spanish National Health System (NHS).

The study focused on resource use and costs associated with episodes of SSSIs caused by Gram-positive bacteria. The records of patients treated with OPAT in each center were used to describe resource use per episode, understanding an episode as the complete infectious process (from conventional hospitalization – if it occurred – to HaH).

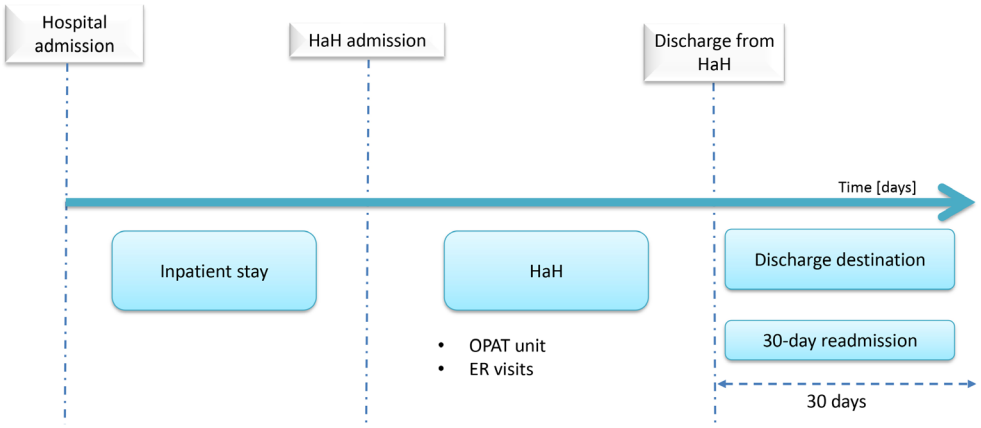
The study population included patients aged ≥ 18 years of both sexes included in the HaH-based OPAT Registry and hospitalized due to SSSIs caused by a Gram-positive bacteria. Therefore, the study population was composed of patients who met the general criteria for inclusion in a HaH Unit and the specific criteria for OPAT (Supplementary Table A1).

Data collection. The HaH-based OPAT Registry includes sociodemographic variables (age and sex), clinical variables (Charlson index, main diagnosis, microorganism) and specific OPAT variables (active ingredient, dosage, treatment duration, clinical response, destination at discharge and readmission within 30 days). Diagnoses were recorded using the coding of the Spanish version of the Clinical Modification of the International Classification of Diseases, ninth revision (ICD-9-MC).

Resource use related to SSSIs included home visits (medical and nursing), emergency room visits, conventional hospitalization stay, HaH stay and antimicrobial treatment.

The analysis was based on complete infectious episodes, lasting from the initiation of conventional hospitalization, if any, to HaH discharge, including possible rehospitalization related to the infectious process (Figure 1).

Costs. To estimate the economic impact of SSSIs from the NHS perspective in Spain, direct health costs were included. The unit costs of resource use were obtained from the ESALUD database [17] and pharmacological treatments on the website of the General Council of the Official Colleges of Pharmacists (Bot PLUS) (General Council of Official Colleges of Pharmacists, 2013). The unit cost of the conventional hospital stay was ob-



HaH, hospital-at-home; OPAT, outpatient parenteral antimicrobial therapy; ER, emergency room.

Figure 1 **Depiction of the complete infectious episodes, covering the time from inpatient hospitalisation, if any, until HaH discharge, including possible returns to the hospital related to the infectious process.**

tained from the CMBD (Ministry of Health, 2019) and the HaH stay was obtained from the literature [13]. All costs were updated to 2019 euros (Supplementary Table A2).

Direct health costs included resource use during hospitalization (conventional and home) due to SSSIs due to Gram-positive bacteria (conventional hospitalization stay, if any, HaH stay, home visits [physician and nurse] and emergency room visits). In episodes in which the patient's discharge destination was related return to the hospital of origin due to SSSIs, the cost per mean stay of conventional hospitalization was added according to the mean hospital stay in Spain.

The costs of visits were calculated by multiplying the number of visits by the unit cost of each visit. The cost of the hospital stay (conventional and home) was obtained by multiplying the days of stay by the corresponding unit cost. The total dose was calculated for each active substance during hospitalization (conventional and home). For this, the dose scheduled for the time on treatment was multiplied. The cost of each pharmacological treatment was obtained by multiplying the total dose that each patient received during hospitalization by the unit cost of each treatment. The wholesale price was applied without VAT, according to the presentation of the medicine.

If HaH discharge was followed by readmission within 30 days, the readmission cost was added to the original cost of the episode. The readmission may have been in the home OPAT service or in conventional hospitalization. If readmission was in the OPAT service, all data necessary to calculate the cost of re-entry using the previous methodology was available in the HaH-based OPAT Registry. If readmission within 30 days was in conventional hospitalization, the HaH-based OPAT Registry does not have the information corresponding to the associated resource use and the cost was estimated according to the cost per mean hospital stay in Spain.

Stratification. Stratification analyses were made to estimate the hospital stay and the cost of SSSIs according to the main diagnosis (cellulitis, surgical wound infection, diabetic foot infection, skin abscess, vascular ulcer infection, pressure ulcer infection, traumatic wound infection and other SSSIs).

Statistical analysis. All analyses were performed using complete infectious episodes as the unit of analysis. A descriptive analysis of the variables included in the study was made. Quantitative variables were described using means, standard deviation (SD), medians and interquartile range (IQR). Qualitative variables were analyzed using absolute and relative frequencies. For cost variables, the mean and 95% confidence intervals (CI) were used. The CIs were obtained using the bootstrapping technique, given the non-normality of the results. The R (version 3.6.1) statistical package was used for the statistical analysis.

RESULTS

The initial cohort included 1,055 patients (1,160 episodes) with SSSIs from the 24 participating centers: 189 patients (194 episodes) met the criteria for analysis (Figure 2).

Most patients were male (54.6%) with a median age of 63 years (IQR: 53.7–77.5). In approximately 40% of episodes, patients had high comorbidity with a Charlson index ≥3 points. The most frequent main diagnoses were cellulitis (26.8%) and surgical wound infection (24.2%), while the most frequent causal microorganism was *Staphylococcus aureus* (57.7%) (Table 1).

The clinical results are shown in table 1. In > 90% of episodes, there was an improvement or cure of the infection after OPAT. The discharge destination from HaH was the home/nurs-

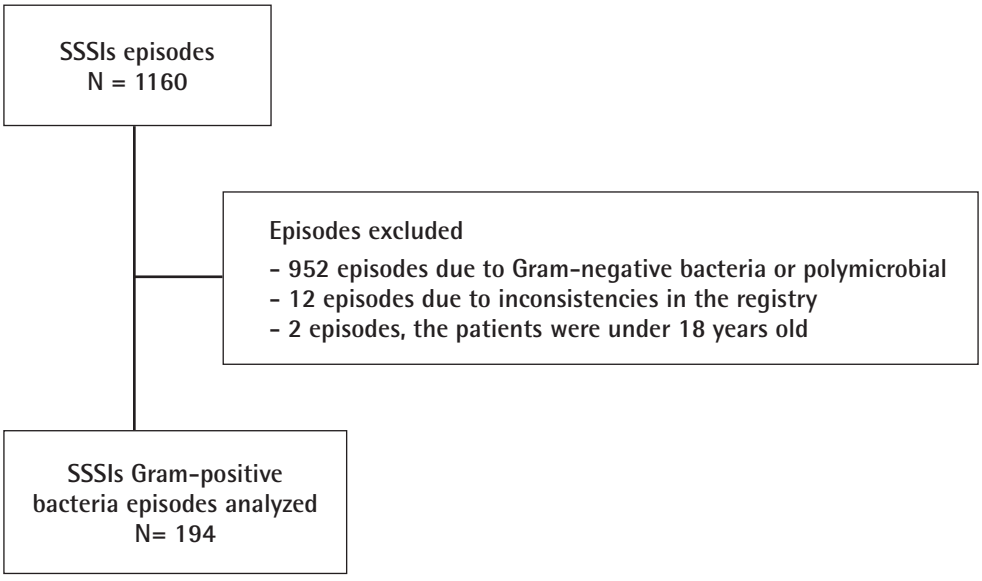


Figure 2 Flowchart of the episodes included in the analysis

SSSIs, skin and skin structure infections.

ing home/social health center of origin in 91.2% of episodes while, in 14 episodes related return to the hospital of origin was required (10 episodes of SSSIs due to Gram-positive bacteria and 4 episodes due to other causes). There were 6.2% of readmissions for any cause during the 30 days following discharge. In 92.0% of these, the entire stay due to readmission was in conventional hospitalization and the rest were treated in HaH (Table 1).

Resource use. The mean duration (SD) of admission for the complete infectious process was 26.1 days (20.9), of which 8.0 (10.6) days corresponded to the mean conventional hospitalization stay and 18.1 (16.7) days to the HaH stay. The median HaH stay was 13 days [IQR: 8.0-22.7] (Table 2). The most frequently used antibiotics were daptomycin (28.3%), ertapenem (19.1%) and ceftriaxone (15.5%) (Table 2).

The mean rate (SD) of home visits by the HaH unit team was 1.2 (0.32) visits per day of home stay. A nurse attended almost daily during admission to the HaH unit (0.86 visits per day of stay) while medical visits occurred approximately every three days (0.37 visits per day of stay). Visits to the emergency room were uncommon, with a mean rate of 1 (3.3) visits per 100 days of HaH (Table 2).

Costs. Table 3 shows the costs of the complete infectious process, including conventional hospitalization if any, HaH unit admission, return to the hospital related to the infectious process and rehospitalization for any cause during the 30 days after discharge. During the study period, the mean cost per episode of the complete infectious process was €7,326 (95% CI: 6,316–8,416), of which the cost of admission to HaH was €1,528 (95% CI: 1,353–1,734), representing 21% of the cost.

Days of stay and costs according to the main diagnosis. Figure 3 shows the length of stay (Figure 3a) and the total costs (Figure 3b) of the complete infectious process according to the main diagnosis that motivated hospital admission. The main diagnosis due to surgical wound infection had a longer median stay (28 days [IQR: 17.0–40.5]) and a higher mean cost (€12,438 [95% CI: 9,686–15,525]), compared with the other main diagnoses. These results should be interpreted with caution due to the small sample size in the subgroups.

DISCUSSION

In this study, the cost of the conventional hospital stay before home hospital admission was included, so the cost of the complete infectious process (conventional and home) of SSSIs due to Gram-positive bacteria requiring hospital admission was estimated. A notable difference was observed in the total cost of conventional hospitalization and that of HaH. In times of financial constraints, OPAT has advantages in the treatment of SSSIs requiring intravenous treatment and clinical follow-up.

SSSIs are a significant economic burden for the Spanish NHS due to hospital treatments, surgical procedures and pharmacological treatment. In general, patients with SSSIs are difficult to treat, and those with comorbidities have longer hospital stays, a higher rate of modification of the initial antimicrobial treatment, greater reinfection or recurrence, and higher mortality rates, compared with patients with SSSIs

Table 1 **Baseline characteristics and efficacy results of OPAT in patients with SSSIs due to Gram-positive bacteria**

VARIABLE Baseline characteristics	
Age [years][a]	
Median [IQR]	63.2 [53.7;77.5]
Sex - n (%)	
Male	106 (54.6%)
Charlson index - n (%)[b]	
<3 points	102 (60.4%)
≥3 points	67 (39.6%)
Median [IQR]	2.0 [1.0;3.0]
Main diagnosis - n (%)	
Cellulitis	52 (26.8%)
Surgical wound infection	47 (24.2%)
Diabetic foot infection	23 (11.9%)
Skin abscess	21 (10.8%)
Other skin and skin structure Infections	21 (10.8%)
Vascular ulcer infection	14 (7.2%)
Pressure ulcer infection	13 (6.7%)
Traumatic wound infection	3 (1.5%)
Microorganism - n (%)[c]	
Staphylococcus aureus	112 (57.7%)
Streptococcus agalactiae	14 (7.2%)
Staphylococcus epidermidis	13 (6.7%)
Enterococcus faecalis	11 (5.7%)
Staphylococcus (coagulase negative) other spp	9 (4.6%)
Streptococcus pyogenes	9 (4.6%)
Streptococcus group viridians	8 (4.1%)
Staphylococcus lugdunensis	6 (3.1%)
Streptococcus other spp	6 (3.1%)
Other	15 (7.7%)

VARIABLE Baseline characteristics	
Referring service[d]	
Medical	73 (37.6%)
Surgical	68 (35.1%)
Emergency	35 (18.0%)
Other service	16 (8.2%)
Not available service	2 (1.0%)
OPAT efficacy results	
Clinical response - n (%)[e]	
Improvement	103 (56.0%)
Healing	70 (38.0%)
Failure	6 (3.3%)
Relapse	2 (1.1%)
Other	3 (1.6%)
Discharge destination - n (%)	
Home	171 (88.1%)
SSSIs-related return	10 (5.1%)
Residence/social health center	6 (3.1%)
Return unrelated to SSSIs	4 (2.1%)
Death	2 (1.0%)
Another hospital	1 (0.5%)
Readmission within 30 days – n (%)	12 (6.2%)

Valid N = 194 episodes with SSSIs due to Gram-positive bacteria. SSSIs, skin and skin structure infections; OPAT, oral parenteral antibiotic therapy; IQR, interquartile range. [a]Age at admission to hospital at home. [b]Information available in 169 episodes. [c]Other microorganisms: *Clostridium* other spp, *Corynebacterium* spp, *Enterococcus faecium*, *Enterococcus* other spp, *Finegoldia magna*, *Peptostreptococcus anaerobius*, *Propionibacterium* spp, *Staphylococcus haemolyticus*, *Staphylococcus homonis*, *Streptococcus pneumoniae*. [d]Surgical service: Angiology and vascular surgery, cardiovascular surgery, general and digestive system surgery, plastic and reconstructive surgery, gynecology and obstetrics, traumatology and orthopedics and urology. Medical service: Cardiology, infectious diseases, internal medicine, nephrology, pulmonology, medical oncology, rheumatology. [e]Information available in 184 episodes.

without comorbidities [20,21]. In this analysis, we found that 40% of HaH patients had a Charlson comorbidity index score of ≥3 points. Several studies have analyzed the economic impact in Spain of patients with SSSIs. The mean cost per patient treated varies between €2,857 and €7,917 [22–25], meaning an annual expenditure of between €13.5 and €23.5 million [26,27].

Our results show that the mean cost per complete infectious episode was € 7,326, of which 71.6% (€ 5,246) was due to conventional hospitalization and 20.8% (€ 1,528) to HaH. The mean cost obtained is higher than that found in other studies. A possible explanation is that our analysis includes the resources used throughout the infectious process (including readmissions from HaH due to poor evolution and readmissions 30 days after HaH discharge) in real clinical practice. Various studies have found HaH units are a good option for the management and control of serious and complex infections [13,14,28]. The costs of OPAT have been calculated in several studies [29–38]. All concluded that OPAT is equally as safe and effective as conventional hospitalization at a lower cost. This suggests that OPAT for serious and complex infections may be an alternative in which HaH units are more efficient, reducing the stay and avoiding hospital admission [39].

We found the overall mean stay (conventional hospitalization and OPAT) was 26.1 days, slightly higher than the 18.5 days observed in an observational study in 10 European countries in patients hospitalized due to complicated SSSIs (Ostermann et al., 2014). One reason for the increased stay may be that, in our series, 24% of patients had surgical wound infection, compared with 12% of those in the RECH study [21], which implies a longer hospital stay due to the

Table 2 Resource use per episode associated with SSSIs due to Gram-positive bacteria

VARIABLE	
Hospital stay	**Mean (SD)** **Median [IQR]**
Number of days of the episode of SSSIs due to Gram-positive bacteria	26.1 (20.9) 19.0 [12.0;34.7]
Number of days of previous conventional hospitalization	8.0 (10.6) 5.0 [1.0;10.7]
Days without antimicrobial treatment	4.5 (9.1) 0.0 [0.0;5.0]
Days with antimicrobial treatment	3.5 (6.0) 1.0 [0.0;5.0]
Number of days in HaH	18.1 (16.7) 13.0 [8.0;22.7]
Days without antimicrobial treatment	6.4 (13.4) 1.0 [0.0;7.0]
Days with antimicrobial treatment	11.7 (9.7) 8.0 [6.0;14.0]
Number of visits	**Mean (SD)**
Rate of total visits (physicians + nursing)	1.23 (0.32)
Rate of medical visits	0.37 (0.14)
Rate of nursing visits	0.86 (0.24)
Rate of emergency visits[a]	1 (3.3)
Antibiotic treatments	**n (%)**
Daptomycin	55 (28.3%)
Ertapenem	37 (19.1%)
Ceftriaxone	30 (15.5%)
Piperacillin - tazobactam	21 (10.8%)
Cloxacillin	19 (9.8%)
Vancomycin	17 (8.8%)
Teicoplanin	9 (4.6%)
Levofloxacin	7 (3.6%)
Meropenemb	7 (3.6%)
Amoxicillin - clavulanic[b]	6 (3.1%)
Gentamicin	5 (2.6%)
Linezolid	4 (2.1%)
Clindamycin	2 (1.0%)
Imipenem - cilastatin[b]	2 (1.0%)
Penicillin G sodium	2 (1.0%)
Other[c]	6 (3.1%))

Valid N = 194 episodes of gram-positive SSSIs. SSSIs, skin and skin structure infections; CH conventional hospitalization; HaH, hospital at home; OPAT, oral parenteral antibiotic therapy; SD, standard deviation; IQR, interquartile range.

[a]Visitation rate per 100 days of HaH stay.

[b]Self-administered intravenous antibiotics.

[c]Others: amikacin, ampicillin, cefazolin, ceftazidime, ciprofloxacin and tigecycline.

study of post-surgical fever, the need for drainage, reoperations, etc. Some studies have found that episodes of patients undergoing OPAT have a longer stay compared with conventional hospitalization. For example, a mean duration of 24 days of OPAT was observed in a cohort of 72 patients, which lasted up to 42 days when the duration of previous hospital treatment was added, a far cry from the 19 days of treatment in comparison groups of hospitalized patients [32].

Table 3 Cost (euros) per episode associated with SSSIs due to Gram-positive bacteria

VARIABLE	Mean (95% CI)
Cost of previous conventional hospitalization - Total	5,246 (4,332 - 6,295)
Cost of conventional hospitalization	5,137 (4,230 - 6,168)
Cost of antimicrobial treatment	109 (78.4 - 148)
HaH Cost - Total	1,528 (1,353 - 1,734)
Cost of HaH stay	1,085 (956 - 1,239)
Cost of antimicrobial treatment	443 (365 - 532)
Cost of discharge destination	274 (124 - 423)
Cost of 30-day readmission	278 (133 - 452)
Total cost	7,326 (6,316 - 8,416)

Valid N = 194 episodes of gram-positive SSSIs.
SSSIs, skin and skin structure infections; HaH, hospital at home; CI, confidence intervals.

This may indicate that patients may be selected for OPAT because they have infections requiring longer antimicrobial treatments. These patients also often have infections due to multidrug-resistant pathogens with no alternative oral antibiotic use, which means all treatment must be with parenteral antibiotics. Almost half of the patients in our study had secondary infections (surgical wound infection, diabetic foot infections, pressure ulcer infection, vascular ulcers), which may have contributed to the longer length of stay. In these cases, it is more difficult to reach the antibiotic concentration in the focus, which is essential for eradicating microorganisms. In addition, the characteristics inherent in the HaH model, such as the time spent travelling, which limits the number of times the patient is seen, may contribute to a longer total stay. However, this does not translate into higher costs or worse care.

We found a rate of cure or improvement of > 90%, similar to the findings of other studies (87%-92%) [31,40,41]. Theocharis et al. [35] found a significantly lower cure rate (72.5%), although the patients treated were older (mean of 85 years vs 64 years in our cohort) and the associated mortality rate was 27.5%, much higher than the 1% found in our study. The quality of care of the OPAT program in HaH units is reflected in the rate of readmissions in 30 days (6.2%), similar to that found in other studies, as shown by the review by Chapman et al. [42] .

Studies have found that the inadequate use of antimicrobials, including inappropriate choices or administration, is associated with the expansion of multidrug-resistant strains [43,44]. The complex management of infectious diseases and the increase in resistance has led to the introduction of antimicrobial use optimization programs (PROA) in hospitals [45,46], which have been shown to improve the prognosis by optimizing the prescription of antibiotics. Therefore, the use of effective, safe, easy-to-use antibiotics for the treatment of Gram-positive bacterial infections is of special clinical relevance, as it has been observed that, for example, vancomycin, teicoplanin, daptomycin and linezolid have limitations due to toxicity, tolerance and drug resistance [47–53]. Inappropriate antibiotic use is also associated with increased costs due to prolongation of the hospital stay, so the cost of the drug should not be used as the only criterion for the selection of treatment.

Novel antibiotics effective against multidrug-resistant Gram-positive bacteria have been approved in recent years, such as tedizolid (oxazolidinone oral or intravenous administration) [54], delafloxacin (4th generation quinolone oral or intravenous administration) [55], dalbavancin [56] and oritavancin [57] which can facilitate the outpatient treatment of BSSSI. Due to their long half-lives, dalbavancin (two-dose) and oritavancin (single-dose) have promising potential to reduce the number of hospital stays and for use within the OPAT program in HaH units, particularly in vulnerable patients and/or those with low adherence [58,59]. The possibility of reducing the number of visits can offset the higher cost of these antibiotics.

LIMITATIONS

The study has some limitations which may have influenced the results. Firstly, the retrospective nature: however, it was not possible to compare costs using a prospective study in which patients were randomly assigned to one of two treatment groups, hospital or home. However, our study shows the strength of an analysis in real clinical practice. Second, the unit cost considered for the day of HaH stay. Due to the study design, we could not estimate the costs based on the accounts of the hospitals, so this was extracted from the literature. In any case, the unit cost assumed comes from an estimate made in the HaH-based OPAT Registry [13] from the analytical accounting of the participating hospitals, so we consider that the estimate is adjusted to reality. Although the total costs were representative of episodes of SSSIs caused by Gram-positive bacteria in each center, they may not be representative of the episodes in centers not participating in the HaH-based OPAT Registry or of global episodes of SSSIs in Spain.

CONCLUSIONS

SSSIs caused by Gram-positive bacteria result in a significant consumption of resources and costs by the Spanish NHS, and the conventional hospitalization stay is the main contributor. Our results suggest that OPAT administered by HaH is a safe, efficient alternative for the management of these infections and could lead to lower costs compared with hospital admission.

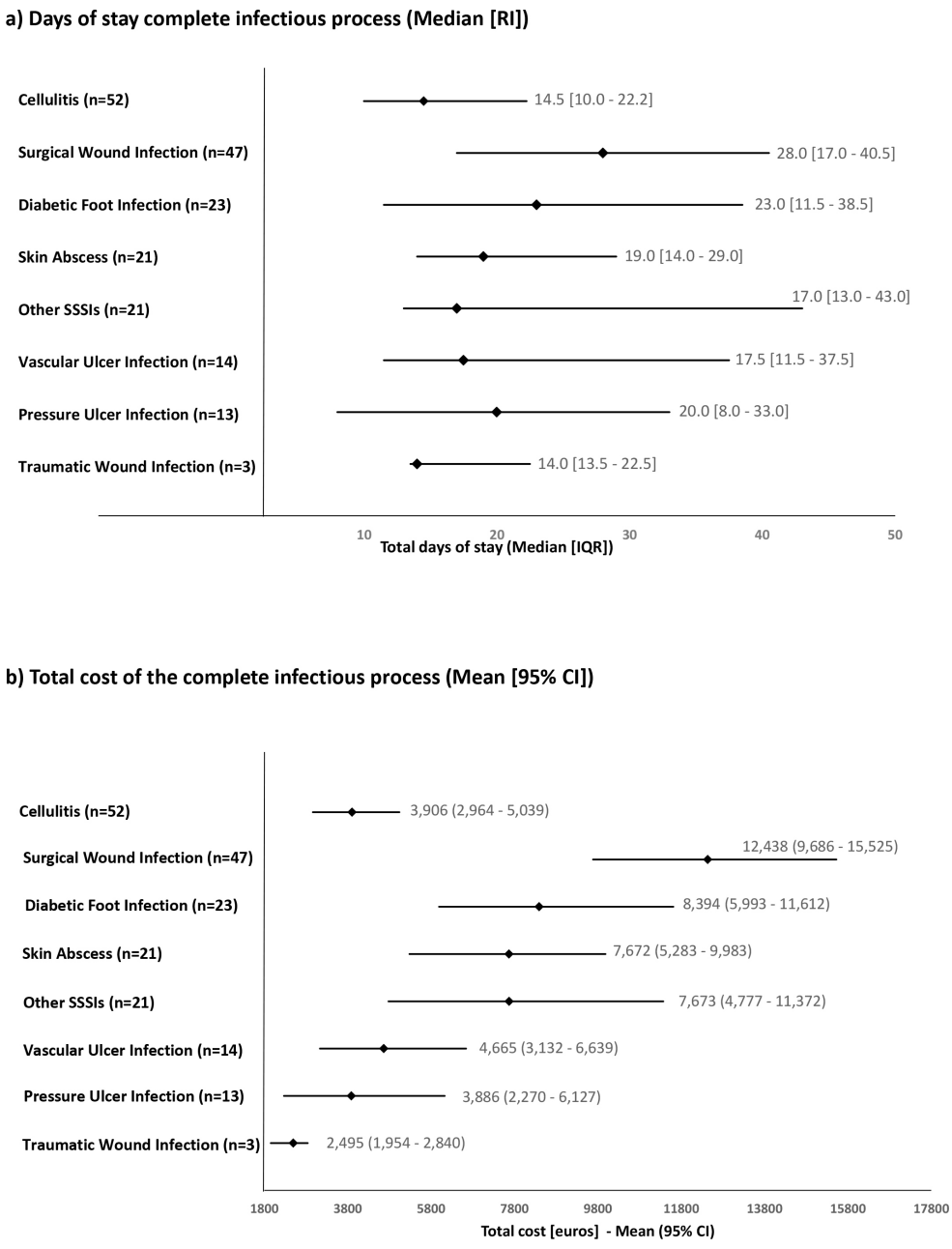


Figure 3 Hospital stay and total cost associated with episodes of SSSIs due to Gram-positive bacteria according to main diagnosis

SSSIs, skin and skin structure infections; IR, interquartile range; CI, confidence interval.

FUNDING

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CONFLICTS OF INTEREST

Manuel Mirón Rubio received fees as a speaker in conferences from Merck Sharp and Dohme, Aldo-Unión Lab, and has lectured at meetings organized by pharmaceutical companies (Merck Share and Dohme, Rovi, Angelini Pharma) or participated in some medical advice.

Juan José Parra Jordán reported no conflicts of interest

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