

Treatment of selected canine dermatological conditions in Portugal – a research survey

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Abstract

Introduction: *Staphylococcus pseudintermedius* and *Malassezia pachydermatis* often cause skin diseases in dogs. **Material and Methods:** An online survey was e-mailed to veterinary practices nationwide covering demographics, diagnosis methods, and oral and topical treatment options. Of the 740 surveys sent, 100 complete replies were obtained. **Results:** The majority of clinicians were unaware of the existence of the International Society for Companion Animal Infectious Diseases guidelines or did not follow them (53%). Oral antibiotics were used universally for superficial bacterial folliculitis treatment, particularly amoxicillin-clavulanic acid (100%), cephalexin (94%), enrofloxacin (67%), or marbofloxacin (60%). For fold dermatitis (FD) and otitis externa (OE), oral antibiotics were also given as treatment in 88% and 82% of cases, respectively. Oral antifungals were often prescribed for generalised *Malassezia* dermatitis (85%), FD (70%), and OE (59%). *S. pseudintermedius* and *M. pachydermatis* were frequently treated topically, particularly with antibacterials or antifungals only, or a combination of antibacterials, antifungals, and glucocorticoids. Alternative options such as honey-based products were not frequently used. **Conclusion:** Our survey suggests that oral antibiotics are overused by Portuguese clinicians despite the spread of antibiotic resistant *S. pseudintermedius*. Oral antibiotics and antifungals are commonly prescribed for skin conditions manageable with topical treatments.

Keywords: dogs, *Staphylococcus pseudintermedius*, *Malassezia pachydermatis*, antibacterials, antifungals, survey.

Introduction

Canine pyoderma, particularly superficial bacterial folliculitis (SBF), and otitis externa (OE), are common reasons for veterinary consultation. *Staphylococcus pseudintermedius*, although normally isolated from healthy skin, mucosa, and ear canals, can also act as an opportunist pathogen. It is invariably associated with SBF, as well as commonly found in cases of OE (1, 21, 16, 18).

Malassezia pachydermatis is a normal inhabitant of canine skin and ears, although, when an adequate environment is created, it can also act as an

opportunistic pathogen. This yeast commonly causes *Malassezia* dermatitis (MD) in dogs and is frequently associated with canine OE (21, 24, 27). Skin infections can be treated with antibiotics and topical antiseptics like chlorhexidine (5, 18). Bacterial culture and antibiotic susceptibility testing increases the likelihood of prescribing the correct antibiotic (5, 8). An increase in the proliferation of antibiotic resistance has led to the demand for alternative treatments, for example with natural products, preferably to which microorganisms cannot acquire resistance. Widespread occurrences of methicillin-resistant *S. pseudintermedius* (MRSP) are well documented, and resistance to azoles in

M. pachydermatis isolates has also been reported (8, 10, 14, 20, 22, 28).

This study had three objectives: first, to evaluate the current practice in Portugal regarding diagnosis and treatment of SBF, fold dermatitis (FD), and bacterial OE caused by *S. pseudintermedius* and compare it with the International Society for Companion Animal Infectious Diseases (ISCAID) recommendations. Secondly, to investigate the diagnostic methodology and treatment for dermatitis, FD, and OE caused by *M. pachydermatis*, and finally, to determine if alternative topical products, namely medical honey, are being used in the management of these conditions.

Material and Methods

Survey. An 18-question survey was developed in Google Forms to interrogate practitioner approach to the diagnosis and management of skin and ear infections associated with *S. pseudintermedius* or *M. pachydermatis* in dogs. Two questions were designed to assess diagnostic approaches, 13 questions addressed treatment choices, and three questions covered participant demographics. The questions were designed to avoid bias by being multiple-choice and permitting only one option to be selected (with the exception of one question).

An e-mail was sent nationwide in October 2017 through Mailchimp software (the Rocket Science Group, Atlanta, USA) with the link to the survey. It was directed to 740 veterinary hospitals and clinics

located in Portugal and was intentionally limited to only one survey per practice.

Results

Total replies. From the total of 740 e-mails, we obtained 103 replies (a 14% response rate). Three surveys were incomplete and thus excluded. A total of 100 replies were considered valid.

Demographics. Fifty-two respondents were located in the centre of the country, 31 were from the south and 15 from the northern regions. One response came from the Azores and one from the Madeira archipelago. Thirteen percent of respondents had been in practice for less than 5 years, 26% between 5 and 10 years, 42% between 10 and 20 years, and 19% had more than 20 years of clinical experience.

Use of the ISCAID guidelines. About a third (32%) of the respondents applied the ISCAID guidelines for the diagnosis and treatment of SBF in practice. Most participants were not aware of the guidelines (53%) or did not apply them in practice (15%).

Diagnosis. Of the four conditions surveyed, the prevalence was highest for OE. On a monthly basis, all clinicians diagnosed at least one case of OE (100%). *Malassezia* dermatitis was the next disease most commonly seen disease (81%), followed by FD (68%) and SBF (64%) (Fig. 1).

Cytological evaluation was more commonly used in cases of OE (91%), followed by MD (88%), SBF (83%), and FD (72%) (Fig. 2).

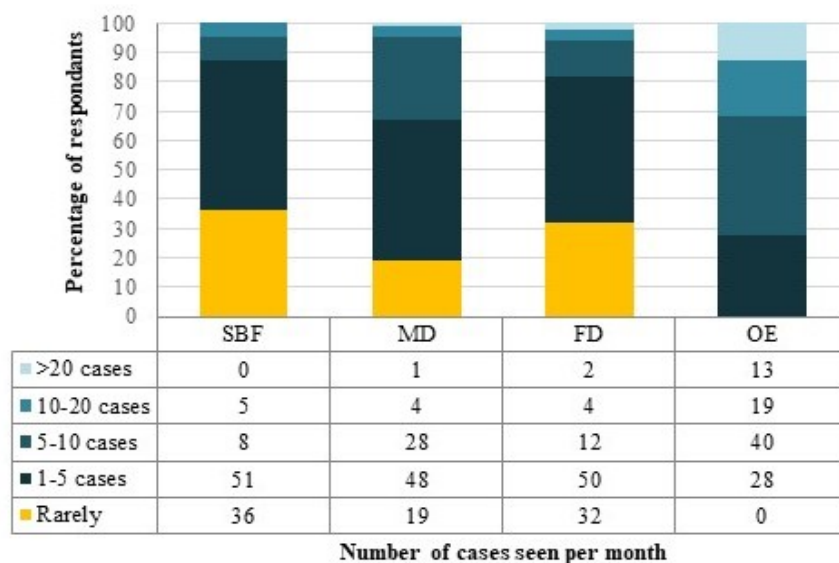


Fig. 1. Number of superficial bacterial folliculitis (SBF), *Malassezia* dermatitis (MD), fold dermatitis (FD), and otitis externa (OE) cases observed per month

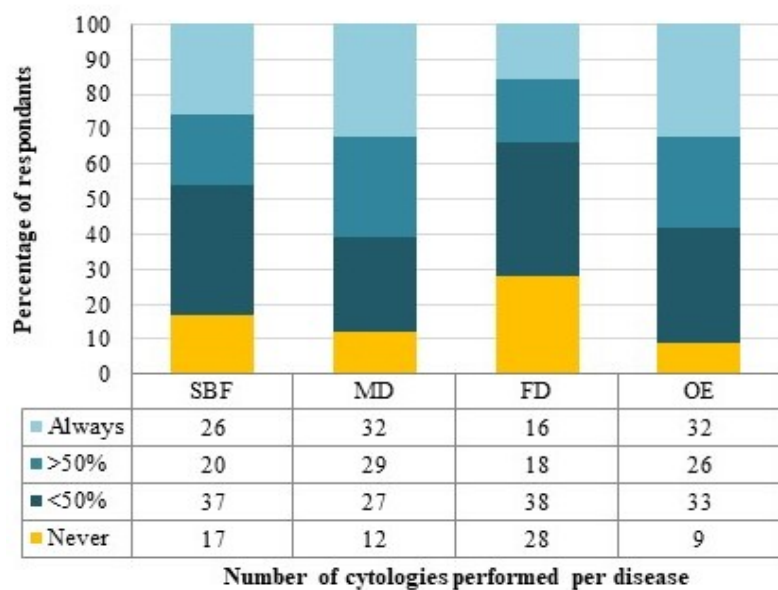


Fig. 2. Cytological evaluation for diagnosis confirmation of superficial bacterial folliculitis (SBF), *Malassezia dermatitis* (MD), fold dermatitis (FD), and otitis externa (OE)

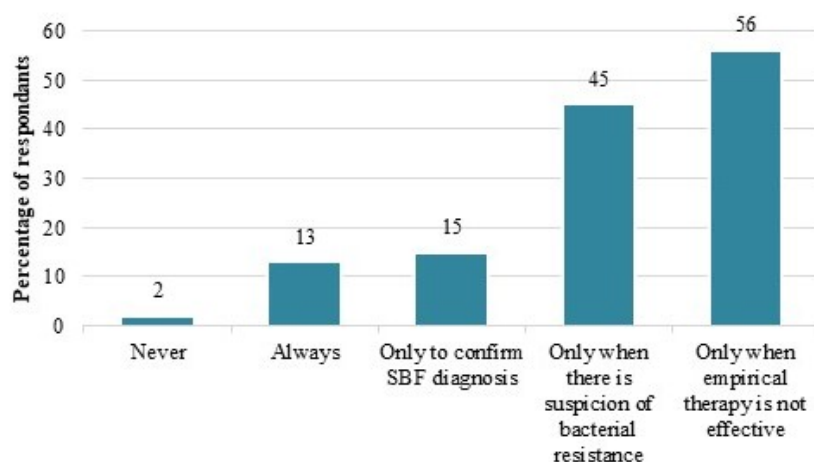


Fig. 3. Reasons for the use of bacterial culture and antibiotic susceptibility testing in cases of superficial bacterial folliculitis (SBF)

Presence of antibiotic resistance in SBF. All clinicians observed cases of SBF caused by antibiotic-resistant *S. pseudintermedius*. In fact, most clinicians (57%) declared an increase in the number of antibiotic-resistant cases seen in the last five years, whereas 33% did not think this was the case. Ten percent did not have an opinion on the prevalence of antibiotic resistance in *S. pseudintermedius*. Most clinicians treated SBF with empirical antibiotic therapy and only considered bacterial culture and antibiotic susceptibility testing after unsuccessful empirical treatment. Cases suspected at the initial stage of being aggravated by

bacterial resistance were another reason for culture and antibiotic susceptibility, and in such cases this step was taken prior to treatment (Fig. 3).

Treatment of bacterial infections

Oral antibiotherapy. Oral antibiotics were frequently prescribed to manage infections due to *S. pseudintermedius* (Fig. 4). The results showed that SBF cases are very likely to be treated with oral antibiotics as 100% of the participants considered

prescribing them in this circumstance. In FD and OE, the clinician still considered prescribing oral antibiotics in 88% and 82% of the cases, respectively.

For the treatment of SBF, amoxicillin with clavulanic acid was considered by all the clinicians. Cephalixin was also very commonly used (94%), followed by enrofloxacin (67%) and marbofloxacin (60%). Antibiotics less commonly used were clindamycin (48%), cefovecin (30%), doxycycline (24%), trimethoprim with sulfamethoxazole (22%), and minocycline (10%) (Fig. 5).

Topical therapy in bacterial infections. Participants prescribed therapeutic baths for SBF

treatment followed by skin disinfection. The treatment was performed with topical antibiotics (either associated with antifungals or glucocorticoids). Fold dermatitis was managed by disinfection of the skin followed by topical antibiotics. Ear cleaning was frequently prescribed, and topical treatments containing a combination of antibiotic, antifungal, and glucocorticoids were the main choice. If honey-based products were considered, they would mainly be used for SBF and hardly used at all in the treatment of FD and OE. Other products (not specified) were also used by the participants (Table 1).

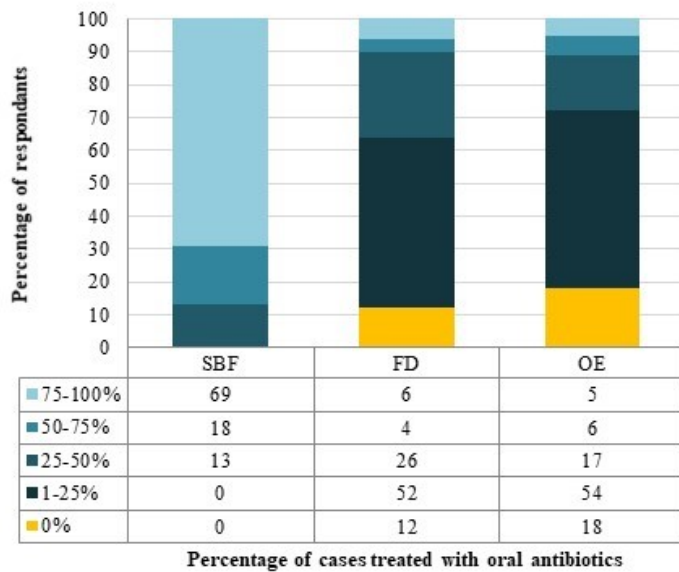


Fig. 4. Oral antibiotherapy use in superficial bacterial folliculitis (SBF), fold dermatitis (FD) and otitis externa (OE) due to *S. pseudintermedius*

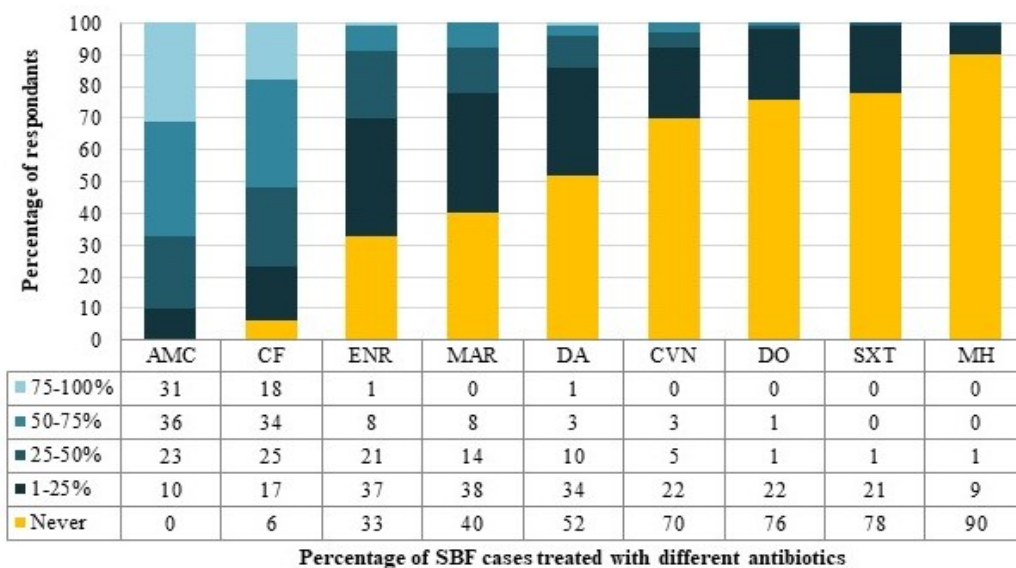
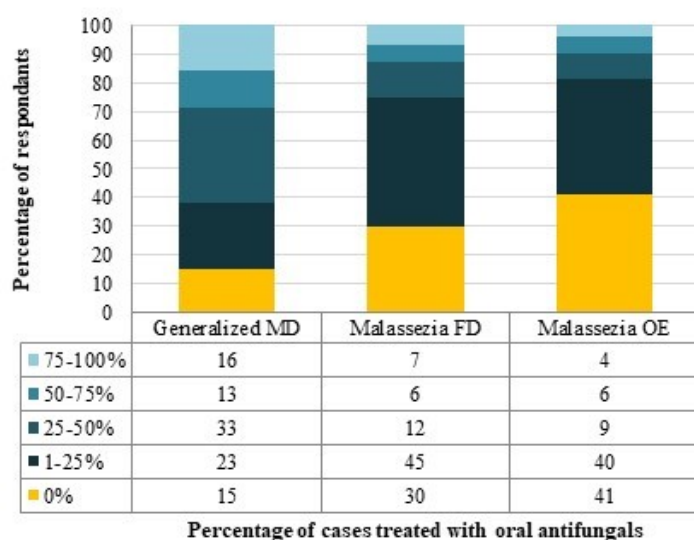


Fig. 5. Use of oral antibiotherapy for superficial bacterial folliculitis: amoxicillin-clavulanic acid (AMC); cephalixin (CF); enrofloxacin (ENR); marbofloxacin (MAR); clindamycin (DA); cefovecin (CVN); doxycycline (DO); trimethoprim-sulfamethoxazole (SXT) and minocycline (MH)

Table 1. Topical therapy in superficial bacterial folliculitis (SBF), bacterial fold dermatitis (FD), and bacterial otitis externa (OE)

	Never	<25%	25%–50%	50%–75%	75%–100%
Superficial bacterial folliculitis					
Therapeutic baths	0	4	18	14	64
Skin disinfection	9	8	15	12	56
Product with antibiotic, antifungal and glucocorticoid	43	31	15	8	3
Product with antibiotic only	43	32	11	7	7
Honey-based products	67	23	6	3	1
Other products	69	17	6	4	4
Bacterial fold dermatitis					
Skin disinfection	0	3	2	15	80
Product with antibiotic, antifungal, and glucocorticoid	29	26	8	21	16
Product with antibiotic only	34	25	7	20	14
Honey-based product	80	12	2	3	3
Other products	72	12	1	8	7
Bacterial otitis externa					
Ear cleaning	3	0	6	4	87
Product with antibiotic, antifungal and glucocorticoid	2	8	6	23	61
Product with antibiotic only	54	24	10	9	3
Honey-based product	92	6	2	0	0
Other products	74	14	7	2	3

**Fig. 6.** Oral antifungal use in generalised *Malassezia* dermatitis (MD), *Malassezia* fold dermatitis (FD), and *Malassezia* otitis externa (OE) cases

Treatment of *Malassezia* infections

Oral antifungals. For the treatment of generalised MD, oral antifungals were used by 85% of the clinicians. Concerning *Malassezia* FD and OE, oral antifungals were prescribed by 70% and 59% of the clinicians, respectively (Fig. 6).

Topical therapy in *Malassezia* infections. Topical treatment of generalised MD was performed with bathing and skin disinfection, and with products

containing only antifungals. *Malassezia* FD was managed with skin disinfection followed by application of products containing antibiotic and antifungal agents and glucocorticoids. Ear cleaning followed by use of products with antibiotic and antifungal effect and glucocorticoid content was the treatment adopted for OE. Honey-based products are hardly used for any of the diseases caused by *Malassezia*. Other products that were not specified were also used by the clinicians (Table 2).

Table 2. Use of topical therapy in *Malassezia* dermatitis (MD), fold dermatitis (FD), and otitis externa (OE)

Generalised <i>Malassezia</i> dermatitis	Never	<25%	25%–50%	50%–75%	75%–100%
Therapeutic baths	0	1	7	5	87
Skin disinfection	20	12	7	12	49
Product with antibiotic, antifungal, and glucocorticoid	53	21	13	10	3
Product with antifungal only	36	17	19	12	16
Honey-based product	96	3	0	1	0
Other products	78	6	3	7	6
<i>Malassezia</i> fold dermatitis					
Skin disinfection	1	2	6	7	84
Product with antibiotic, antifungal, and glucocorticoid	29	20	17	16	18
Product with antifungal only	34	18	25	10	13
Honey-based product	90	6	2	1	1
Other products	74	11	5	5	5
<i>Malassezia</i> otitis externa					
Ear cleaning	4	1	3	8	84
Product with antibiotic, antifungal, and glucocorticoid	7	6	12	15	59
Product with antifungal only	61	12	9	10	8
Honey-based product	95	2	2	0	1
Other products	80	9	3	0	8

Discussion

This study showed that largely oral antibiotics were used for the treatment of SBF, FD, and OE. Diagnostic approach is an issue, in veterinarians' failure to use of appropriate diagnostic tests for the conditions considered in the survey.

The majority of clinicians who collaborated in this survey were experienced in small animal practice and had been working for over 10 years. The conditions considered were observed routinely by the practitioners. This is in accordance with previous literature which states that SBF is a common disease and also one of the main reasons for antimicrobial prescription in small animal practice (4, 33). Otitis externa is also a common cause for consultation (3, 29, 31). *Malassezia* dermatitis is another frequent disease and is normally associated with an underlying cause such as atopic dermatitis (9, 25). Skin fold dermatitis is also very common, particularly in brachycephalic dogs and breeds with excessive skin folds (5). Lately, brachycephalic breeds have become very common in Portugal, exemplified most clearly by the French Bulldog, and this might be the reason for the high prevalence of FD observed by the clinicians in this study.

In general, the survey demonstrated that cytology could be more thoroughly used by clinicians for diagnostic purposes. In fact, only approximately a quarter of the clinicians performed it in every case. Cytology is a simple, inexpensive, and reliable diagnostic test that can easily be performed in a consultation by the clinician (5). Unfortunately, 17%

of the clinicians never used this diagnostic tool for the diseases considered in this study, which is surprising, bearing in mind that adhesive cellophane testing is the most suitable alternative test for diagnosis of MD (7). Otic cytology allows discrimination between bacteria and *Malassezia* yeasts, and therefore is superior to the adhesive cellophane tape test as the appearance and odour of ear exudate adhering to tape cannot be used to reach a reliable diagnosis (2, 21).

Clinicians always considered the use of oral antibiotherapy in SBF cases. Overall, clinicians preferred to begin therapy with oral antibiotics, empirically, and if clinical improvement was not observed, they resorted to bacterial culture and susceptibility testing. When bacterial resistance is suspected, the clinicians will also perform culture and susceptibility testing. There are situations when bacterial culture is particularly important, mainly in cases of apparent antimicrobial resistance (18).

However, the number of clinicians who never used bacterial culture, never tested for antibiotic susceptibility, or only used culture for diagnostic purposes is surprising. In fact, most of the participants had diagnosed cases of SBF with antibiotic resistance to *S. pseudintermedius* and had recognised an increase in antibiotic resistance in the last five years. The problem of their diminishing effectiveness is therefore escalating. In Portugal, methicillin and multidrug resistant *S. pseudintermedius* were reported for the first time in 2010 and in other papers thereafter (6, 11, 12, 32).

Bacterial FD and OE were also largely treated with oral antibiotics, which adds further concern.

Exposure to antibiotics has been associated with the development of resistance by *S. pseudintermedius* isolates, either from skin lesions or from OE (18, 23, 35, 36).

This survey showed that amoxicillin-clavulanic acid and cephalexin were the most frequently prescribed antibiotics for SBF treatment, followed by enrofloxacin and marbofloxacin. Other antibiotics such as clindamycin, trimethoprim-sulfamethoxazole, cefovecin, doxycycline, and minocycline were less frequently used. This is in accordance with official data: penicillins, first and second generation cephalosporins, and fluoroquinolones are the most prescribed antibiotics in small animal practice (15). Macrolides and tetracyclines are less often used, as well as sulphonamides and lincosamides (15). A 16-year study in Portugal documented an increase in *S. pseudintermedius* resistance against oxacillin, ampicillin, amoxicillin, penicillin, cefovecin, cefalexin, enrofloxacin, clindamycin, and trimethoprim-sulfamethoxazole. Cephalosporins have been putatively implicated in the development of MRSP (13). Another study reports misuse of antimicrobials such as fluoroquinolones, macrolides, and third generation cephalosporins, demonstrating correlation with MRSP colonisation (34). Based on the results of this survey, we recommend that fluoroquinolones should be used with more caution. Clinicians principally use antibiotics in the treatment of SBF, FD, and OE, in spite of the conservative recommendations of the ISCAID guidelines. The guidelines developed by ISCAID are a great asset to help the clinician recognise the signs of canine SBF, choose the correct diagnostic tools, and determine the most appropriate topical or systemic antimicrobial therapy (18). In reality, most of the practitioners do not follow or are not aware of the ISCAID guidelines, although the reasons are not explained in this survey.

In general, all clinicians recommended the application of therapeutic baths and skin disinfection in cases of bacterial or *Malassezia* infections. The use of antibiotic and antimycotic based-products was also frequent, in contrast to honey-based products which were rarely applied.

According to our findings, topical treatment with honey-based products is seldom prescribed. The efficacy of a honey-based gel was also confirmed for the treatment of bacterial and/or *Malassezia* otitis externa and canine intertrigo (19, 26). The same product has been proven to be effective against MSSP and MRSP originating from SBF cases. The product also eradicated *M. pachydermatis* originating from OE (30). Medical honey or honey-based products are potential treatments for the diseases considered in this study and could be used more often in Portugal.

This survey contributed to understanding how Portuguese veterinarians are diagnosing and treating superficial bacterial folliculitis, *Malassezia* dermatitis, fold dermatitis, and otitis. It uncovered a lack of

awareness of the ISCAID guidelines, an increasing perception of antibiotic-resistant *S. pseudintermedius*, potential overuse of antibiotics, and lack of antibiotic-free products. Educational actions should be undertaken to increase awareness about the correct use of antibiotics to avoid promulgating bacterial resistance in our country.

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