

Epidemiology of skin and soft tissue pathogens circulating in Liguria in 2011

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SUMMARY

This study was conducted during March-May 2011 with the collaboration of 4 clinical microbiology laboratories evenly distributed across the Ligurian area to identify the most frequent pathogens isolates from skin and soft tissue infections and to evaluate their antibiotic susceptibility patterns. Overall, 213 consecutive, non duplicate strains were collected and sent to the coordinating laboratory. The most represented pathogens were: *S. aureus* (35.7%), *P. aeruginosa* (14%), *E. coli* (12.7%), *Staphylococcus* coagulase negative (6.6%) and *Enterococcus* spp. (4.7%). The data indicate an increase of Gram negative compared to previous years, *S. aureus* remains the most common pathogen. The methicillin resistance in *S. aureus* was 43.4% and no one *Enterococcus* spp. resistant to vancomycin was found.

INTRODUCTION

Skin and soft tissue infections are ubiquitous and the most common of infections and reflect inflammatory microbial invasion of epidermis, dermis and subcutaneous tissues.

The skin is colonized with an indigenous microbial flora, which typically consist of variety of species of staphylococci, corynebacteria, propionibacteria and yeast, in number that may vary from a few hundred to many thousands per square centimetre in the moister areas as the groin and axillae (7).

Empirical antibiotic regimens for complicated skin-structure infections should always include coverage for aerobic Gram-positive cocci, specifically staphylococci and streptococci, and often for anaerobes, including the *Bacteroides fragilis* group (1, 5, 8). Methicillin-resistant *S. aureus* and Gram-negative bacilli are found in some mixed infections, especially those that occur in the hospital (3). Gram-negative organisms and methicillin-resistant staphylococci assume greater importance in superinfections after multiple courses of antibiotics, and in infections associated with profound neutropenia or injection drug use (4, 6, 9).

This survey was planned to identify the most frequent species isolate from skin and soft tissue infections and to evaluate susceptibility patterns among bacteria collected from clinical sample

in Liguria.

MATERIAL AND METHODS

Bacterial isolates

This study was conducted during March 2011-May 2011 with the collaboration of 4 clinical microbiology laboratories in the Ligurian area. The enrolled laboratories were: ASL Imperiese, Imperia; Ente ospedaliero Galliera Hospital, Genoa; International Evangelical Hospital (Voltri division), Genoa; Santa Corona Hospital, Pietra Ligure, Savona.

Overall, 213 consecutive skin and soft tissue isolates were collected and sent to the co-ordinating laboratory (Microbiology Section, DISC, University of Genoa). Strains isolates from in and out-patients were studied, with the exception of duplicate strains from the same patient. Participating laboratories also provided susceptibility data obtained by their routine method.

Antimicrobial susceptibility testing

Minimum inhibitory concentrations were determined by the broth microdilution method suggested by Clinical Laboratory standard Institute (CLSI) (2). The results were reported as susceptible resistant in accordance to CLSI recommendation and compared with those obtained by the original laboratory.

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Escherichia coli ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853 and *Staphylococcus aureus* ATCC 29213 were used as quality control strains.

RESULTS

Table 1 summaries the complete list and the distribution of the pathogens collected in this study.

A total of 213 skin and soft tissue isolates were found, including 111 and 102 isolated from health-care setting or nosocomial and community acquired infections, respectively.

The most represented pathogens were: *S. aureus* (76, 35.7%), *P. aeruginosa* (30, 14%), *E. coli* (27, 12.7%), *Staphylococcus* coagulase negative (CoNS) (14, 6.6%). Nosocomial samples were collected mainly from patients hospitalized in general medicine wards (31, 27.9%), surgery (17, 15.3%), Nefrology and health care settings (HCS) (11, 9.9%), Infectious disease, orthopedic wards and cardiology (7, 6.3%), ICU (5, 4.5%) and other wards (15, 13.5%).

Table 1. Distribution of the strains collected in this survey according to the origin.

STRAINS	NUMBER AND ORIGIN			
	NOS-HC	COM	TOT	%
<i>S. aureus</i>	39	37	76	35.7
CoNS	7	7	14	6.6
<i>P. aeruginosa</i>	17	13	30	14
<i>E. coli</i>	17	10	27	12.7
Other Enterobacteriaceae (<i>P. mirabilis</i> , 15; <i>C. koseri</i> , 1; <i>E. cloacae</i> , 3; <i>K. oxytoca</i> , 2; <i>K. pneumoniae</i> , 11; <i>M. morgani</i> , 3; <i>P. rettgeri</i> , 1; <i>P. stuartii</i> , 1; <i>P. vulgaris</i> , 1; <i>S. marcescens</i> , 5)	20	23	43	20.2
Other Non Enterobacteriaceae (<i>A. baumannii</i> , 3; <i>A. xylosoxidans</i> , 1; <i>B. cepacia</i> , 1; <i>S. malthophilia</i> , 2)	3	4	7	3.3
<i>Enterococcus</i> spp.	4	6	10	4.7
<i>Streptococcus</i> spp.	4	2	6	2.8
Total	111	102	213	
%	52.1	47.9		

Table 2. Percentage of susceptibility to major classes of antibiotics.

	OXA	VAN	LZD	SXT	RIF	TC	GM	ERI	AMP	AMC	CIP	CAZ	IMI	TOB	TIG
<i>S. aureus</i> OXA S (56,6%)		100	100	100	95.3	97.7	69.8				88.4				100
<i>S. aureus</i> OXA R (43,4%)		100	100	37	81.8	78.8	81.8				12.1				100
CoNS	35.7	100	100	71.4	85.7	50	50				64.3				100
<i>P. aeruginosa</i>				0			46.7				43.3	70	60	66.7	86.7
<i>E. coli</i>				63			88.9		22.2	70.4	70.4	74.1	100		100
Other Enterobacteriaceae				60.5			74.4			65.1	62.8	83.7	81.4		
<i>Enterococcus</i> spp.		100		0		75	50	10	80		80				100

Bacterial isolates were obtained from ulcer (87, 40.8%), skin swab (65, 30.5%) and wound swab (61, 28.6%).

The antibiotics susceptibility patterns of the strains collected is displayed in Table 2.

56.6% of *S. aureus* was susceptible to oxacillin. Vancomycin, Linezolid Trimethoprim-sulfamethxazole and Tigecicline were the most active molecule against *S. aureus* MSSA (100% of susceptible strains), followed by Tetracycline (97.7%), Rifampicine (95.3%), Ciprofloxacin (88.4%) and Gentamicin (69.9%), 43.4 % of *S. aureus* was resistant to oxacillin (MRSA). Vancomycin, Linezolid and Tigecicline were the most active molecule against *S. aureus* MRSA (100%), followed by Rifampicine, Gentamicin (81.8%) and Tetracycline (78.8%). The other molecules (Trimethoprim-sulfamethxazole and ciprofloxacin) showed rate of resistance higher than 60%.

Tigecicline was the most effective molecule against *P. aeruginosa* followed by Ceftazidime (70%), Tobramicine (66.7%) and Imipenem (60%).

The other molecule (Ciprofloxacin and Gentamicin) showed rate of resistance higher than 50%.

Tigecicline and Imipenem were the most effective molecule against *E. coli* (100%), followed by Gentamicin (88.9 %), Ceftazidime (74.1%), Amoxicillin-Clavulanate and Ciprofloxacin (74.1%) and Trimethoprim-sulfamethxazole (63%).

All *Enterococcus* spp. was susceptible to Vancomycin.

CONCLUSION

This report described the epidemiology of skin and soft tissue isolates in Liguria and their antibiotics susceptibility patterns, evaluating samples from over 213 patients recruited by 4 hospitals.

The need for local, national or international surveillance to evaluate the rate of bacterial resistance to antibiotics, is generally suggested in order to choose the best drug in empiric therapy, and to gain information about the emerging pathogens and their identification, as well as evolution toward resistance to the more frequently used antimicrobials.

S. aureus was the most frequent pathogens isolated from Healthcare setting and from community acquired infections, which accounted for 35.7% of all isolates collected. 43.4% of *S. aureus* was MRSA, 47% (16/34) Healthcare, 32.4% (12/37) community and 100% (5/5) RSA. The new agents for the treatment of methicillin-resistant *S. aureus* infections (Linezolid and Tigecycline) are active against all MRSA.

P. aeruginosa has been isolated mainly from nosocomial patients (56.7%) and in ulcer sample (50%). Tigecycline is the most effective molecule against this pathogen and all *P. aeruginosa* are resistant to Trimethoprim-sulfamethoxazole.

As regards the non-enterobacteriaceae strains there were no high percentages of resistance.

All *Enterococcus* spp. were susceptible to vancomycin.

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