

***StaphNET South America: Establishing a network for genomic surveillance of  
Staphylococcus aureus in South America  
October 8th and 9th, 2018***

***School of Pharmacy and Biochemistry of Universidad de Buenos Aires***

# **MRSA in a small city of Southern Argentina**

***Gabriela Rubinstein***

**San Carlos de Bariloche  
Province of Rio Negro  
Patagonia Argentina**

# Presentation outline

- Introduction to the city of Bariloche and its health services.
- Local surveillance results on antimicrobial susceptibility of *Staphylococcus aureus* obtained between 2001 and 2017 and communicated at Argentinian meetings.
- Short conclusion

# San Carlos de Bariloche



Founded in 1902

Population: 130.000 (rapid growth)

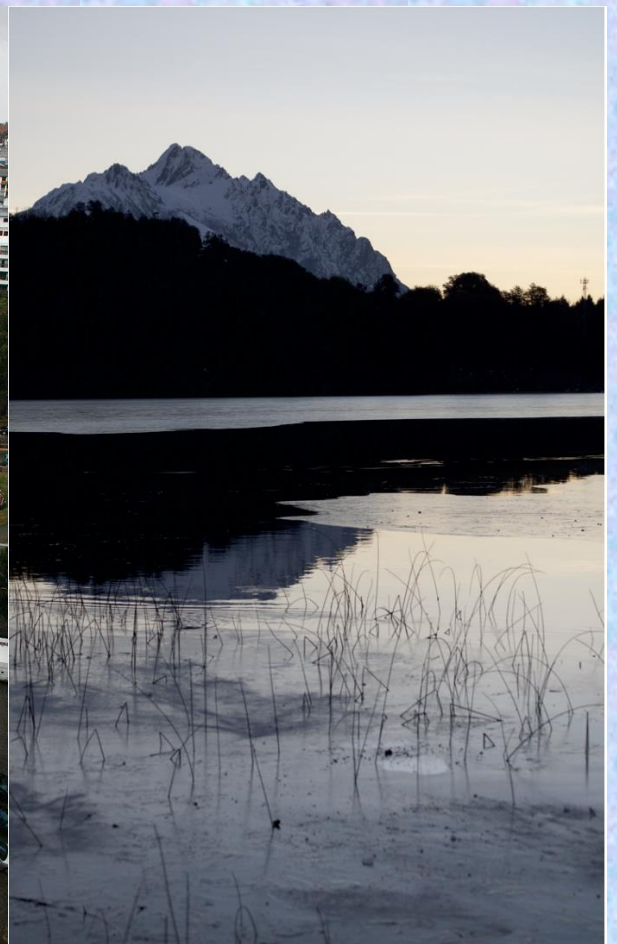
Mean temp: 13.5 C (average low: 3.7 C)



Bariloche in 1916



# San Carlos de Bariloche





# Health centers in Bariloche

- Hospital Zonal Bariloche
- Sanatorio San Carlos
- Hospital Privado Regional
- Sanatorio del Sol



Rubinstein, G & F. Spinelli (2006). **Staphylococcus aureus meticolino-resistentes (SAMR) en infecciones nosocomiales de un hospital de Bariloche**. Congreso Sociedad Argentina de Bacteriología (Asoc. Arg. de Microbiol.) (Bs. As, 31 de Oct. y 01 de Nov. 2006).

- ✓ Study Period: 2001-2005.
- ✓ Number of isolates: 51 (48 inpatients)
- ✓ Type of samples: blood (7), catheter (3), respiratory materials (15), puncture materials (6), wounds (7), urine (7), nasal swabs (3).
- ✓ Most patients were in Intensive care Units
- ✓ Most isolates (92,2% IC: 81,5-96,9) presented the same susceptibility pattern

## Susceptibility patterns of IHMRSA isolated in Bariloche (2001-2005).

<i>Susceptibility pattern</i>	<i>Number of isolates</i>
<i>S: TMS, TET, RIFA, VAN, NIT*. R: OXA, ERY, CLI, GEN, CIP.</i>	<i>47</i>
<i>S: VAN R: OXA, ERY, CLI, GEN, CIP, TMS, TET, RIFA.</i>	<i>1</i>
<i>S: ERY, CLI, GEN, CIP, TMS, TET, VAN. R: OXA, RIFA.</i>	<i>1</i>
<i>S: GEN, TMS, TET, RIFA, VAN. R: OXA, ERY, CLI, CIP</i>	<i>1</i>
<i>S: ERY, CLI, CIP, TMS, TET, VAN. R: OXA, RIFA, GEN.</i>	<i>1</i>

\* Tested in only 10 isolates



# Conclusion

- ✓ The clear predominance of one resistant phenotype of MRSA in our hospital suggest the presence in Bariloche of an endemic clone.
- ✓ This phenotype is identical to that described in Córdoba in 1999, in Bs. As. in 2003 and originally in Chile during 1996-1998 (clon chileno/cordobés).
- ✓ This should be confirmed by molecular characterization.



Bavdaz, B., Rubinstein, G. & F. Spinelli (2007). **Baja resistencia a los antimicrobianos en *Staphylococcus aureus* de pacientes ambulatorios en Bariloche.** XI Congreso Argentino de Microbiología (Cordoba, 10 al 12 de Oct. de 2007).

- ✓ Study Period: Jan 2004-Jun 2007
- ✓ Number of isolates: 252
- ✓ Type of samples: skin and soft tissues (51%), urine (18%), nasal swabs (16%), others (18%)
- ✓ All outpatients

*Antimicrobial resistance (%) of community acquired Staphylococcus aureus in Bariloche (2004-2006)*

	ERI	CLI	TMS	CIP	RFA	GEN	OXA
2004 (n=56)	23	18	0	0	2	4	3
2005 (n=72)	9	6	1	1	2	16	1
2006 (n=74)	6	3	1	3	0	13	1
Global	13	9	1	2	2	13	2

**Of the 5 MRSA, 2 were only resistant to Beta lactams while 3 were also resistant to GEN and RFA**

# Conclusions

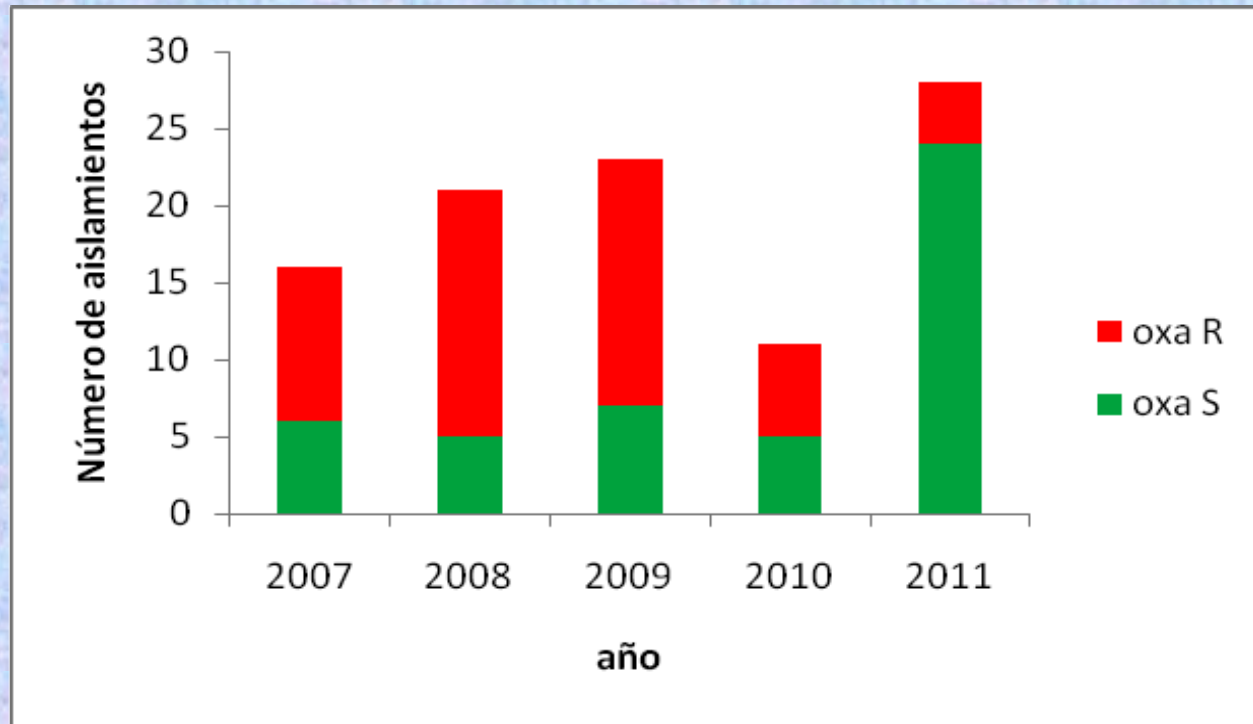
- ✓ In contrast with that described in other regions of Argentina, MRSA prevalence in outpatients from Bariloche was low.
- ✓ In addition there was very good activity for other antibiotics particularly TMS, CIP y RFA with 99%, 98% and 98% of sensitivity .
- ✓ However surveillance should continue given the possibility of the spread of epidemic CAMRSA clones described in other locations.



Rubinstein, G. & F. Spinelli (2012). **Disminución espontánea de la prevalencia de *Staphylococcus aureus* metcilino resistente intrahospitalario.** VII Congreso de la Sociedad Argentina de Bacteriología, Micología y Parasitología Clínicas- SADEBAC. 27, 28 y 29 de junio 2012, Buenos Aires.

- ✓ Study Period: 2007-2011
- ✓ Number of isolates: 99
- ✓ Type of samples: blood (30), catheter (8), respiratory materials (18), puncture materials (10), wounds (22), urine (4), bone and joint samples (7).
- ✓ 52,5% of the isolates were MRSA; all of them presented the same susceptibility pattern: R to OXA, GEN, ERI, CLIN, y CIP, and S to tms, rifa y tet.
- ✓ SAMS were all S to CIP, TMS, RIF y TET, but R to ERI and CLI, 6,4% and to gen 4,2% a.

# Number of isolates of *Staphylococcus aureus* from inpatients OXA R y OXA S.



MRSA annual prevalence was; 2007: 62,5%, 2008: 76,2%, 2009: 69,6%, 2010: 54,5% y 2011: 14,3%

# Conclusions

- ✓ As previously described, MRSA isolated from inpatients during the study period show identical susceptibility pattern suggesting the presence of the epidemic clone “chileno/cordobés”.
- ✓ However for the first time in 2011 the MRSA incidence was lower than that of the MSSA.
- ✓ This significant change in spite of the absence of infectious control measures shows a modification in the behaviour of SA in our hospital.
- ✓ Molecular characterization might contribute to the understanding of this observed change.



Rubinstein, G., Bavdaz, BG., & F. Spinelli (2013). **Epidemiologia de Staphylococcus aureus metcilino resistente en Bariloche**. XIII Congreso Argentino de Microbiología (Buenos Aires, 23 al 26 de Sept. de 2013).

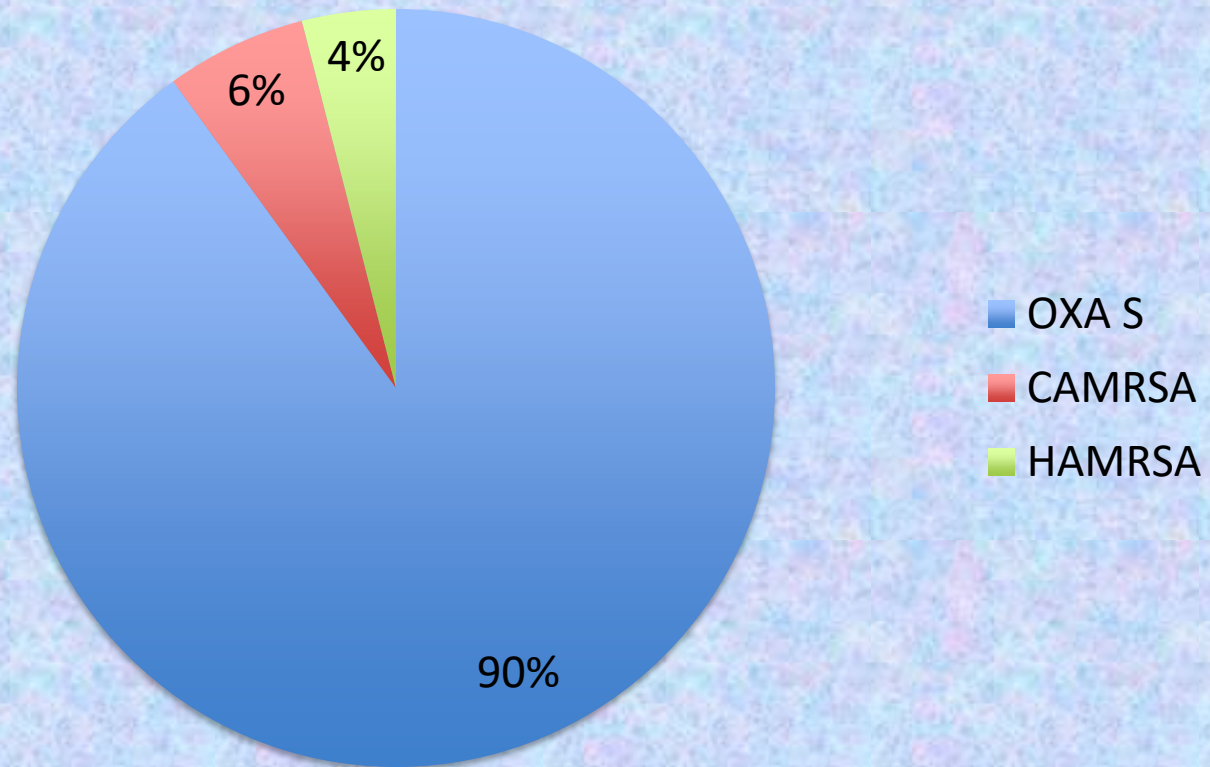
- ✓ Study period: Jan 2011 – May 2013
- ✓ Number of clinical isolates: 262
- ✓ Classification due to Type of infections: PPB (soft tissue infection) NPPB (no PPB) and ISQ (surgical site infection)
- ✓ Classification of MRSA due to resistance phenotype:  
CASAMR: when resistant to two or less non betalactam antibiotics (NBLA) and
- ✓ HAMRSA when resistant to 3 NBLA or more.
- ✓ Patients were classified in outpatients, in patients and health associated patients

- ✓ 26 (9,9%) isolates were SAMR.
- ✓ All HASAMR were isolated from IH o AACs and with the exception of one isolate they presented identical resistance pattern, suggesting that they belong o the Chilean- Cordobes clone.
- ✓ 50% of CASAMR were resistant only to  $\beta$  lactám antibiotics. Four presented also resistance to ERI, 2 to GEN and 2 to GEN and CIP.

*Global resistance (%) of S.aureus (2011-2013)*

<b>OXA</b>	<b>ERI</b>	<b>CLI</b>	<b>CIP</b>	<b>RIF</b>	<b>TET</b>	<b>GEN</b>
9.9	14.1	11.5	4.2	0.8	0.8	7.6

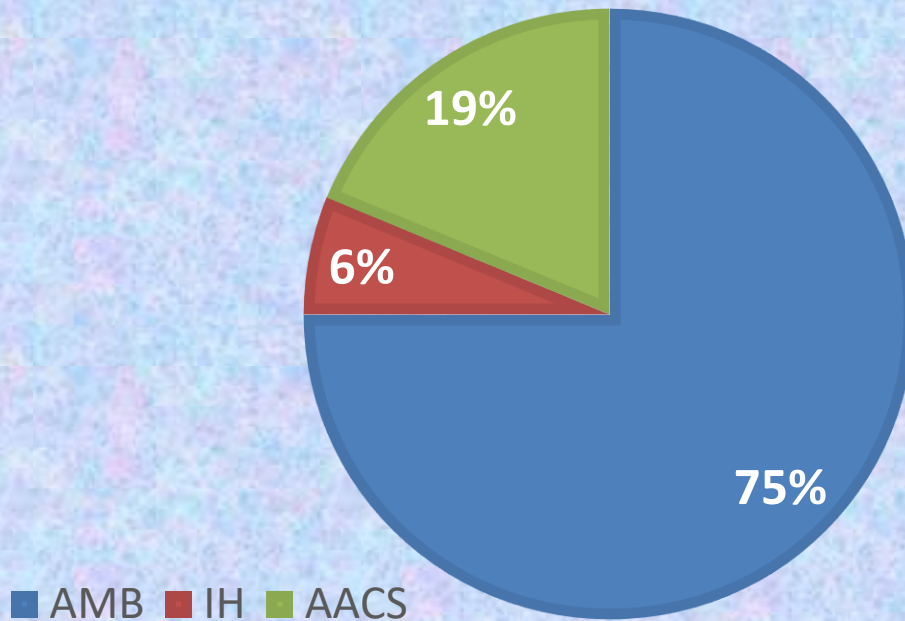
# Global Prevalence of MRSA



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## ORIGIN OF CASAMR



	CASAMR n (%)	HASAMR n (%)
PPB	12 (75)	1 (10)
No PPB	-	8 (80)
ISQ	4 (25)	1 (10)

# Conclusions

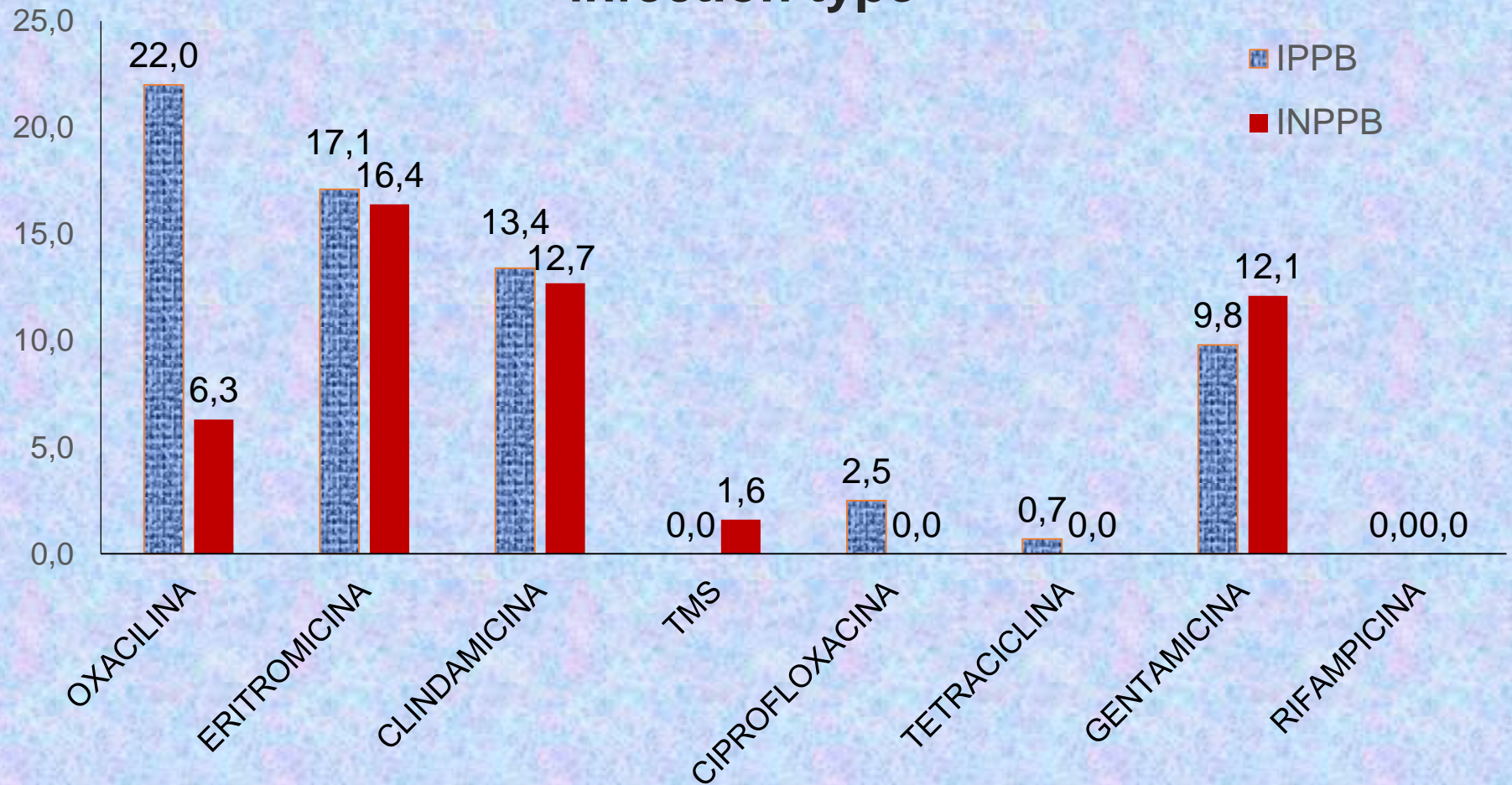
- ✓ In contrast with that described in other regions, MRSA prevalence in Bariloche is low.
- ✓ None of the HAMRSA was isolated in community acquired infections and only one CAMRSA was from a hospital acquired infection.
- ✓ The reason of the difference between our results and national values is unknown but confirm the heterogenic distribution of MRSA

Rubinstein, G., Parsons, G., & J. Sirvent (2017). **Resistencia de Staphylococcus aureus en Bariloche, adquiridos en la comunidad.** Congreso Nacional Bioquímico CUBRA XIV, Bariloche, 2,3 y 4 de Noviembre de 2017.

- ✓ Study Period: October 2015 to may 2017
- ✓ Number of isolates: 145
- ✓ 82 skin and soft tissue infections (IPPB: abscess, impetigo, furuncles, hematomas, myositis.)
- ✓ 63 others (INPPB: arthritis, surgical wounds, bone infections, urine etc.)



## Resistance (%) of *S. aureus* according to infection type



# Conclusions

- ✓ Only Oxacillin resistance was significantly different between the two study groups ( $p=0,0094$ ).
- ✓ 64% of *MRSA* isolated from IPPB were only resistant to oxacillin while the rest presented associated resistance only to one none beta-lactam antibiotic.
- ✓ None CAMRSA isolated from IPPB was resistant to clindamicin.

# General Conclusions

- The characteristic antimicrobial susceptibility phenotypes in SA isolated in Bariloche suggests the presence of epidemic MRSA clones, but has not been confirmed by molecular characterisation.
- The IHMRSA isolates with identical susceptibility pattern of that of the *chileno/cordobés* clone was predominant until 2010 but since 2011 the number of isolates has decreased and only sporadic cases have been isolated in the last years.
- Prevalence of CAMRSA in Bariloche was only 2% during 2004-07, 6,1% in 2011-13 and lately (2015-2017) has reached 22% associated particularly to skin and soft tissues infections suggesting that the dissemination of CAMRSA epidemic clones has occurred only recently.



# Thank you



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