II Jornadas dos
Técnicos Superiores
de Diagnóstico e Terapêutica
ULS Algarve EPE

17 e 18 maio | 2024

One Health approach on resistant bacteria: An innovative strategy to tackle antimicrobial resistance

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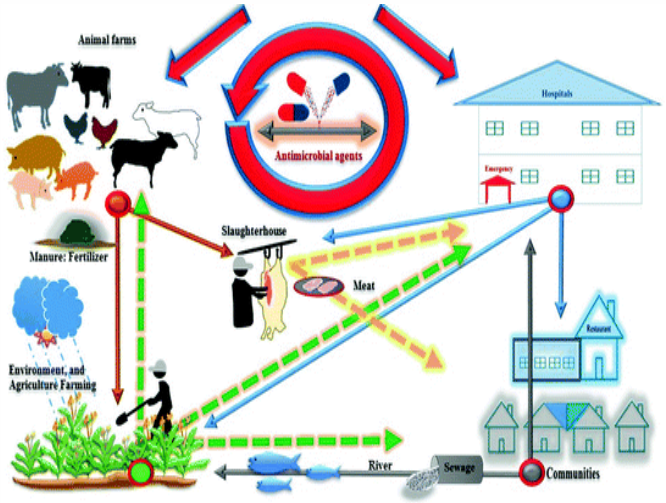
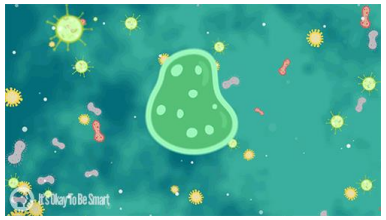
ANTIBIOTIC SELECTION PRESSURE





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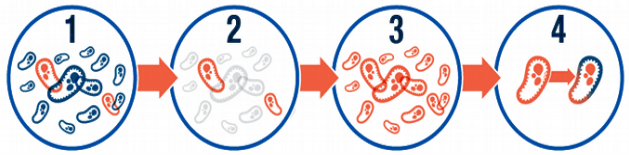
ANTIBIOTIC RESISTANCE



ANTIMICROBIAL RESISTANCE (AMR)

World Health Organization

WHO Global Action Plan on Antimicrobial Resistance

DGS desde 1899 Direção-Geral da Saúde

National Plan to Combat Antimicrobial Resistance 2019-2023

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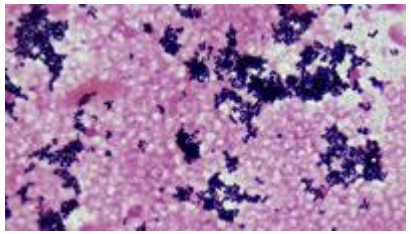
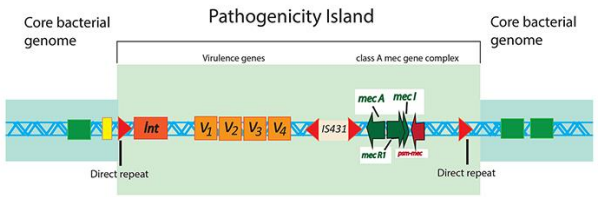
Methicillin Resistant Staphylococcus aureus





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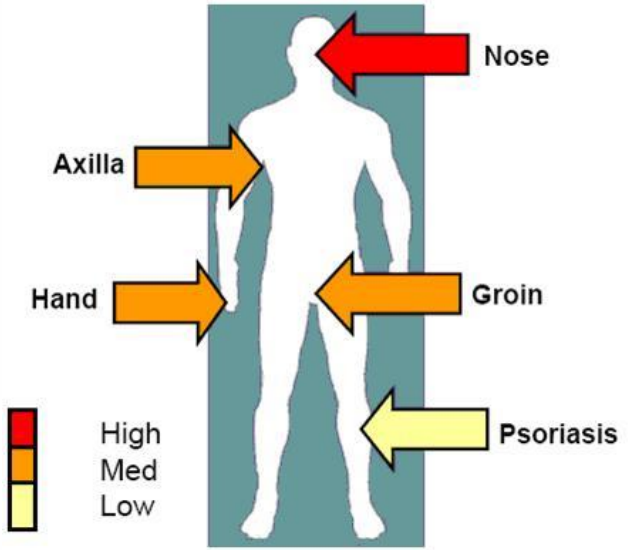
Methicillin Resistant Staphylococcus aureus colonization

Humans



Animals

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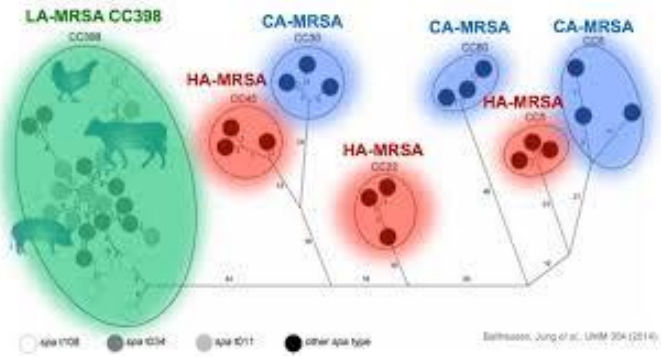
Health Care Associated
HA-MRSA

Community Associated
CA-MRSA

Livestock Associated
LA-MRSA

We aimed to isolate *Methicillin Resistant Staphylococcus aureus* (MRSA) from workers in different Portuguese occupational settings, clinical and environmental, for further screening of clones and priority Antibiotic Resistance Genes (ARGs) in a One Health innovative approach



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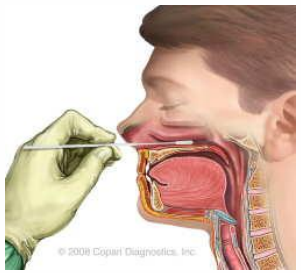
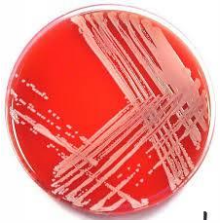
SAMPLING



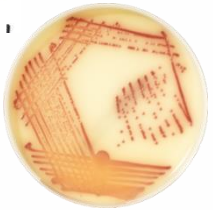
CLASSICAL MICROBIOLOGIC METHODS

24 hours at 37°C

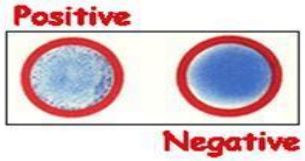


Non selective

MRSA Chromogenic medium



IMMUNOLOGIC METHODS



EXPOSE PROJECT: CONFIRMATION OF MRSA BY MOLECULAR METHODS

Genomic DNA extraction

Confirmation of species identification: PCR *nuc*, *mecA* and *mecC*

Whole genome sequencing of MRSA

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Assessment of Staphylococcus aureus colonization in five pig farms in Portugal

Environmental sampling

Exposed workers (n=26)

Maternity and piglets (n=72)

Prevalence of total bacteria and gram-negative bacteria carriers amongst livestock occupational exposed individuals and animals

	Swabs	Gram-negative bacteria Prevalence
Workers	26	11,5%
Swines	72	65,1%

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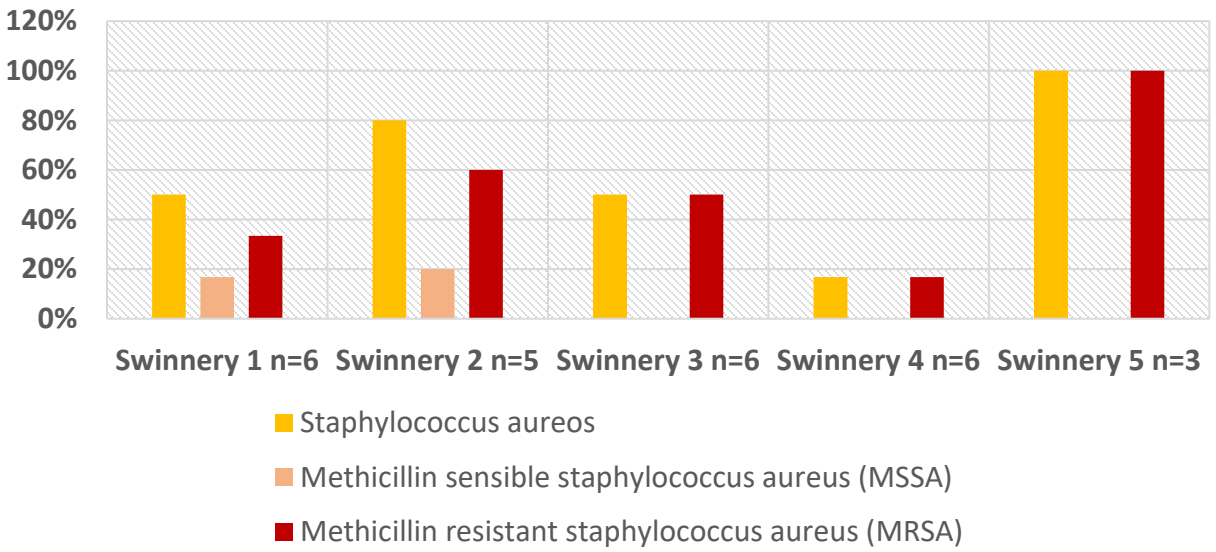
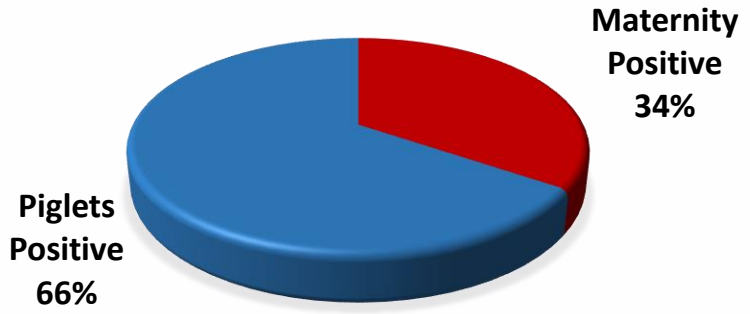
S. AUREUS (MSSA/MRSA) COLONIZATION PREVALENCE IN THE WORKERS OF THE STUDIED SWINNERIES

S. aureus sensible (MSSA) and resistant (MRSA) to methicillin prevalence in the workers of the studied swine productions.



MRSA PREVALENCE IN ANIMALS FROM MATERNITY AND PIGLETS



Extremely high prevalence, reaching to 80% and 100%, and relevantly most of the identified strains were MRSA

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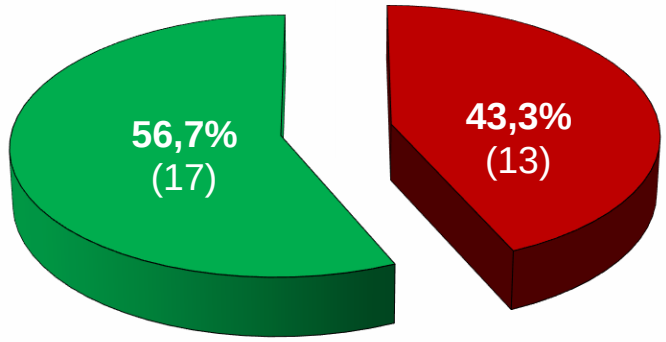
High risk occupational settings for healthcare workers

Workers MRSA colonization in a Lisbon Hospital



In clinical settings, namely in a Hospital in Lisbon (n=30) we observed an MRSA colonization of 43% of workers nasal flora.

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ASSESSMENT OF MRSA WORKERS COLONIZATION AND SURFACES CONTAMINATION IN PRIMARY HEALTH CARE CENTERS

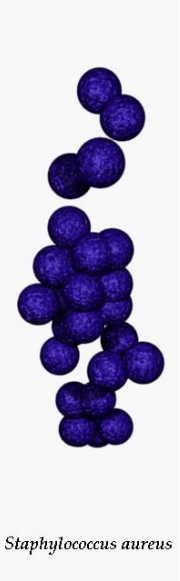
Exposed workers N= 25
Community (control) N=25

MRSA COLONIZATION

MRSA PREVALENCE OF HEALTH CARE WORKERS (23.7% TO 43.3% MRSA) AND COMMUNITY (4% TO 10%) (HEALTHY CONTROLS)

ST5-IVc, t062 Pediatric clone

- Identified for the first time in Portugal 1992.1996
- Infections: children in hospitals and emergency departments (SSTI)
- Colonization: Adults over 60 years.
- Spread worldwide in Pediatric settings.


Staphylococcus aureus

Transposition of HA-MRSA strains to the community.

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The further identification of clone's origin (HA-MRSA; LA-MRSA; CA-MRSA) and the detection of different EFSA priority ARGs in these strains will unveil the actual dispersion and mobility of these microorganism in order to identify high priority settings to tackle AMR

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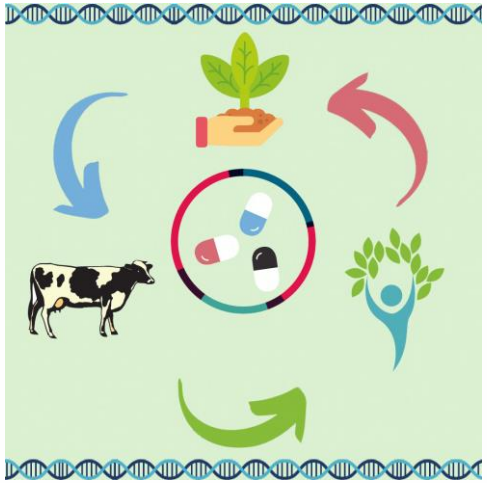
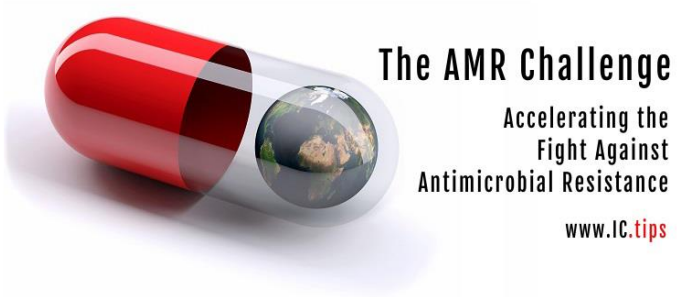
Conclusions

- Urge to monitor bacterial strains, including MRSA, associated with animal carriers, occupational exposed individuals and potential sources of environmental contamination

- Relevantly efforts must be made to determine and regulate the antibiotic selection pressure that is driving their emergence

- Development of innovative One Health approaches to access resistant bacteria such as MRSA and priority ARGs, particularly in high risk occupational settings, with suitable guidelines and validated procedures in order to avoid potential hazardous health outcomes associated with AMR bioaerosols exposure, ARGs dissemination and associated infectious diseases.





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Autoridade pare as Condições de Trabalho (ACT) (2016-2018) “Estudo da exposição profissional a partículas, fungos e micotoxinas na indústria de produção de bolos e pão”. Ref: 005DBB/12

Concurso Anual para Projetos de Investigação, Desenvolvimento, Inovação e Criação Artística (IDI&CA) do IPL – 2016, **BBIOR**-Health “Bacterial Bioburden assessment in the con-text of occupational exposure and animal health of swine productions” Edna Ribeiro – Escola Superior de Tecnologia da Saúde de Lisboa

Concurso SAICT Politécnicos de 2016 - Sistema de Apoio à Investigação Científica e Tecnológica (SAICT) para apoio a Projetos de Investigação Científica e Desenvolvimento Tecnológico (IC&DT) **ExPOSE**: Establishing protocols to assess occupational exposure to microbiota in clinical settings. Escola Superior de Tecnologia da Saúde de Lisboa

Instituto Politécnico de Lisboa, Lisbon, Portugal for funding the Project " Bioburden and Radon in Indoor SPAs Air” (IPL/2018/**BRISAir**_ESTeSL) and Exposure to azole-resistant Aspergillus fumigatus in Portuguese Sawmills (ARAFSawmills) IPL/IDI&CA2023/IPL/**IDI&CA2023/ARAFSawmills_ESTeSL**

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