

Conférence des médecins pénitentiaires suisses (CMPS) Konferenz Schweizerischer Gefängnisärzte (KSG) Conference of Swiss Prison Doctors (CSPD) Conferenza dei medici penitenziari svizzeri (CMPS)



Multiresistente Keime, Pandemie & Co - Übertragbare Krankheiten im Strafvollzug

Dre Anne Iten

Kultur- und Kongresszentrum Bärenmatte in Suhr / Aarau

07. November 2023 im

Presentation plan

1-Multidrug-resistant bacteria

2-Pandemics

3-And Co

Timeline of development of new anbiotic classes vs. resistance



Drug resistant bacteria

How does it happen?



Antibiotic resistance

Overview of the molecular mechnisms



Mechanisms



Nature Reviews Microbiology | Volume 21 | May 2023 | 280-295

www.thelancet.com Vol 387 January 9, 2016

Antibioresistance



Streptococcus pneumoniae



Goossens H. Lancet 2005;365(3459):579-87

Antibiotic resistance

Select Antibiotics
Ceftriaxone
Frythromycin
Levofloxacin
Penicillin
Trimethoprim-sulfamethoxazole



Penicillin resistance



anresis.ch

What are multi-resistant bacteria?

Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance

A.-P. Magiorakos¹, A. Srinivasan², R. B. Carey², Y. Carmeli³, M. E. Falagas^{4,5}, C. G. Giske⁶, S. Harbarth⁷, J. F. Hindler⁸, G. Kahlmeter⁹, B. Olsson-Liljequist¹⁰, D. L. Paterson¹¹, L. B. Rice¹², J. Stelling¹³, M. J. Struelens¹, A. Vatopoulos¹⁴, J. T. Weber² and D. L. Monnet¹



- **MDR** At least 1 resistance in at least 3 different antibiotic families
- XDR Acquired resistance for a molecule in all but 1 or 2 antibiotic families
- **PDR** Acquired resistance in all antibiotic families

Article published online: 7 May 2011 Clin Microbiol Infect 2012; 18: 268–281 10.1111/j.1469-0691.2011.03570.x

Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance

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THEORY		PRACTICE		
MDR	At least 1 resistance in at least 3 different antibiotic families	 Staphylococcus aureus methicillin-resistant (MRSA) = MDR 		
XDR	Acquired resistance for a molecule in all but 1 or 2 antibiotic families	 resistance to methicillin and glycopeptides (vancomycin, etc.) = XDR Enterobacteriaceae (<i>E. coli, K. pneumoniae</i>, etc.) production of an extended-spectrum 		
PDR	Acquired resistance in all antibiotic families	 betalactam (ESBL) = MDR production of a carbapenemase (CPE) = XDR 		

Article published online: 7 May 2011 Clin Microbiol Infect 2012; 18: 268–281 10.1111/j.1469-0691.2011.03570.x

Staphylococcus aureus

Antibiotic resistance



Vancomycin

Methicillin resistance

[%] of Isolates



anresis.ch

Multiresistance....

Emergence of a new antibiotic resistance mechanism in India, Pakistan, and the UK: a molecular, biological, and epidemiological study

Karthikeyan K Kumarasamy, Mark A Toleman, Timothy R Walsh, Jay Bagaria, Fafhana Butt, Ravikumar Balakrishnan, Uma Chaudhary, Michel Doumith, Christian G Giske, Seema Irfan, Padma Krishnan, Anil V Kumar, Sunil Maharjan, Shazad Mushtaq, Tabassum Noorie, David L Paterson, Andrew Pearson, Claire Perry, Rachel Pike, Bhargavi Rao, Ujjwayini Ray, Jayanta B Sarma, Madhu Sharma, Elizabeth Sheridan, Mandayam A Thirunarayan, Jane Turton, Supriya Upadhyay, Marina Warner, William Welfare, David M Livermore, Neil Woodford

Summary

Background Gram-negative Enterobacteriaceae with resistance to carbapenem conferred by New Delhi metallo- β lactamase 1 (NDM-1) are potentially a major global health problem. We investigated the prevalence of NDM-1, ir



MMWR Morbidity and Mortality Weekly Report

Detection of *Enterobacteriaceae* Isolates Carrying Metallo-Beta-Lactamase — United States, 2010

During January–June 2010, three *Enterobacteriaceae* isolates carrying a newly described resistance mechanism, the New Delhi metallo-beta-lactamase Clinicians should be aware of the possibility of NDM-1-producing *Enterobacteriaceae* in patients who have received medical care in India and Pakistan, and abauld amaife allus learning abaus this state.

<u>Klebsiella pneumoniae (</u>EU)



Antibiotic resistance to third generations cephalosporins



Antibiotic resistance to carbapenems



Surveillance Atlas of Infectious Diseases (europa.eu)

Klebsiella pneumoniae

OXA-48 –like-producing K. pneumoniae





NDM-producing K. pneumoniae



KPC-producing K. pneumoniae



Carbapenem-resistant Enterobacterales

Evolution of Kl. pneumoniae resistance in Switzerland

Figure 7. d: Resistance rates in invasive Klebsiella pneumoniae isolates in humans from 2012 to 2021.



Temporal course of CRE in Switzerland



Regional distribution of CPE in Switzerland

Isolates / 100'000 inhabitants



Enterococcus faecium

Antibiotic resistance in UE



Evolution of antibiotic resistance in Switzerland





Vancomycin resistance in Switzerland



Enterococcus faecium

Outbreak in Switzerland

OUTBREAKS

Nosocomial outbreak of vancomycin-resistant Enterococcus faecium (VRE) ST796, Switzerland, 2017 to 2020

Vanja Piezzi¹, Nasstasja Wassilew¹, Andrew Atkinson¹, Stéphanie D'Incau², Tanja Kaspar¹, Helena MB Seth-Smith^{3,4}, Carlo Casanova⁵, Pascal Bittel⁵, Philipp Jent¹, Rami Sommerstein^{1,6}, Niccolò Buetti^{7,8}, Jonas Marschall^{1,9}

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- Institute for Infectious Diseases, University of Bern, Bern, Switzerland
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Evolution of antibiotic resistance in Switzerland





Vancomycin resistance in Switzerland



Antibiotic selection pressure



Burden of antibiotic therapy

How can we measure the burden of antibiotic resistance?

- Incidence in relation to the population
- Prevalence: proportion of R in the species
- Mortality, lethality
- Potential years of life lost = DALY (disability-adjusted life years)

Multiresistant bacteria - Death





Antimicrobial resistance now a leading cause of death worldwide, study finds

Lancet analysis highlights need for urgent action to address antibiotic-resistant bacterial infections



▲ A researcher holds up two culture plates growing bacteria in the presence of discs containing various antibiotics. The one on the right has a strain that is resistant to all antibiotics tested. Photograph: Science History Images/Alamy



TACKLING DRUG-RESISTANT INFECTIONS GLOBALLY: FINAL REPORT AND RECOMMENDATIONS

THE REVIEW ON ANTIMICROBIAL RESISTANCE CHAIRED BY JIM O'NEILL

MAY 2016



DEATHS ATTRIBUTABLE TO AMR EVERY YEAR



Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European Economic Area in 2015: a population-level modelling analysis

Alessandro Cassini, Liselotte Diaz Högberg, Diamantis Plachouras, Annalisa Quattrocchi, Ana Hoxha, Gunnar Skov Simonsen, Mélanie Colomb-Cotinat, Mirjam E Kretzschmar, Brecht Devleesschauwer, Michele Cecchini, Driss Ait Ouakrim, Tiago Cravo Oliveira, Marc J Struelens, Carl Suetens, Dominique L Monnet, and the Burden of AMR Collaborative Group*

Lancet Infect Dis 2019; 19: 56–66



Figure 4: Model estimates of the burden of infections with selected antibiotic-resistant bacteria of public health importance in DALYs per 100 000 population, EU and European Economic Area, 2015 Greece did not report data on S pneumoniae isolates to the European Antimicrobial Resistance Surveillance Network in 2015. DALYs=disability-adjusted life-years.



Associated deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in Switzerland, 2010 to 2019

Michael Gasser¹, Alessandro Cassini^{2,3}, Danilo Lo Fo Wong⁴, Marcello Gelormini⁴, Saskia Andrea Nahrgang⁴, Walter Zingg⁵, Andreas Oskar Kronenberg¹

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2010-2019

Infection	+104%
DALYs	+70%
Death	+111%

DALYs by year and causative antibiotic-resistant bacteria



Year

Cost of antibiotic resistance

Comparison of *Staphylococcus aureus* Infections Due to Susceptible and Resistant Pathogens (14 Matched Pairs)

	Methicillin-	Methicillin-	
	Susceptible	Resistant	P
Median age, y	68	67	
Median hospital days preinfection	3	3	
Median hospital days postinfection	14	18	.04

Comparison of *Pseudomonas Aeruginosa* Infections Due to Susceptible and Resistant Pathogens (10 Matched Pairs)

	Carbapenem- Susceptible	Carbapenem- Resistant	P
Median age, y	65	67	
Median hospital days preinfection	15	12	.004
Median hospital days postinfection	20	33.5	.002

Comparison of *Klebsiella pneumoniae* Infections Due to Susceptible and Resistant Pathogens (9 Matched Pairs)

	ESβL-	ESβL-	
	Negative	Positive	P
Median age, y	77	83	
Median hospital days preinfection	35	9	.02
Median hospital days postinfection	11	29	.03

Comparison of *Acinetobacter Baumanii* Infections Due to Susceptible and Resistant Pathogens (10 Matched Pairs)

	Carbapenem- Susceptible	Carbapenem- Resistant	P
Median age, y	83	76.5	
Median hospital days preinfection	12.5	9.5	.004
Median hospital days postinfection	13	31.5	.02

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY

Campaign to raise awareness of the correct use of antibiotics



Les antibiotiques ne sont pas des bonbons !





«Antibiotika sorgfältig einsetzen, damit sie für Mensch und Tier wirksam bleiben.»



Mehr Infos: richtig-ist-wichtig.ch

"One health" global approach



Presentation plan

1-Multidrug-resistant bacteria

2-Pandemics

3-And Co

Influenza-Pandemie Plan Schweiz

- The central ethical values in the fight against a pandemic are **the protection of life, fairness, freedom, responsibility and solidarity**
- In the event of a crisis, appropriate measures should be taken to prevent disunity
- **Distributive justice** is a principle that must be respected. By this we mean the justice of the rules of distribution and their results
- Every human being has the same value when it comes to life and health
- The life of every person, young or old, man or woman, rich or marginalised, etc..... has the same value.



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Plan suisse de pandémie Influenza

Pandemic distribution principles

Phase	Behandlungsmöglichkeit	Zu behandelnde Personen	Grundregel der Verteilung
1. Phase	Behandlungsmöglichkeit > Behandlungsnachfrage	Alle Bedürftigen	In der Reihenfolge der Anfragen
2. Phase	Behandlungsmöglichkeit < Behandlungsnachfrage	Unmittelbar gefährdete Menschen	Nach Massgabe des Zustandes, der Bedrohung oder Gefährdung
3. Phase	Behandlungsmöglichkeit < dringender Behandlungsbedarf	Nur lebensbedrohlich Erkrankte	Nach Massgabe zunehmender Überlebenschance (vgl. Triage der Katastrophenmedizin)

Evolution of the COVID-19 pandemic, Switzerland and Liechstentein

Pour 100 000 habitants Laboratory-confirmed cases 600 400 200-24.02.2020 01.08 01.11 01.02 01.05 01.08 01.11 01.02 06.06.2022 Cas déclarés — Moyenne sur 7 jours Pour 100 000 habitants 2 24.02.2020 01.06 01.08 01.10 01.12 01.02 01.04 01.06 01.08 01.10 01.12 01.02 06.06.2022

Vaccination

Cas déclarés — Movenne sur 7 jours

Cases hospitalised laboratory confirmed

Evolution of the COVID-19 pandemic, Switzerland

New COVID infections in Swiss prisons



Evolution de la pandémie COVID-19, Suisse et Liechstentein

Laboratory-confirmed cases



New COVID infections in Swiss prisons

Vaccination

Adjusted cumulative risk of COVID-19 infection in the event of a prison outbreak



J Gen Intern Med 36(10):3096–102 DOI: 10.1007/s11606-021-07022-x © Society of General Internal Medicine 2021

Transfers of prisoners and COVID-19 cases to a detention centre



Association between incarcerated population density, COVID-19 incidence in the general population and COVID-19 incidence in Massachusetts prisons 21 April 2020 -11 January 2021



JAMA Intern Med. 2021;181(10):1315-1321. doi:10.1001/jamainternmed.2021.4392 Published online August 9, 2021.

COVID-19 infections in a Lombardy prison March 2020 - February 2021

- In the general population
- Among prison staff
- Among prisoners



Trends from March 1, 2020, to February 28, 2021, in daily active cases (A), new daily confirmed cases (B), and weekly case rates (C).

COVID-19 infections in a Lombardy prison March 2020 - February 2021

Containment measures

- Among prison staff
- Among prisoners





Trends from March 1, 2020, to February 28, 2021, in incarcerated individuals in shared cells vs solitary confinement (A) and new confirmed cases by sick leave among asymptomatic and symptomatic prison staff (B).

COVID-19 infections in prisons: Inmates and prison staff





Nowotny et al. BMC Public Health (2021) 21:1036

COVID-19 infections in prisons: Inmates and prison staff Swiss data



Outbreak of COVID-19 in a Milanese prison 20 February – 30 April 2020 n=123



Epidemic curve

Location



Outbreak of COVID-19 in a Milanese prison 20 February – 30 April 2020

Multimodal initiatives

	Measures	Impact
Preparedness	Create task force including key officers among HCW and CS; identify dedicated areas for triage, quarantine and isolation of COVID-19 confirmed cases; identify most at-risk procedures and dynamics in the prison: develop protocols for active case finding, contact tracing, infection control procedures; staff contingency planning.	Fast decision process and implementation
Limitation of number of possible contacts	Limit movements of people in prison between cells and blocks and access of essential and dedicated staff (CS/HCW) to each block: daily triage for those entering dedicated working area, with symptoms and temperature check; replace family visits and meetings with legal representatives by phone and video calls; restrict staff to certain areas and reduce transfers of people in prison to other cells; movements out of prison allowed only for medical urgency.	
Active case finding Triage for newly admitted prisoners, with PCR test and isolation for 14 days if PCR test is negative; identify probable cases by syndromic screening and segregate them from their inmates; monitor epidemics among prison staff and ensure contact tracing among prison population and staff.		Rapid identification of cases and prompt isolation
Contact tracing	Identification, isolation and screening of all contacts of confirmed cases among prison population and prison staff.	Contain outbreak spread
Availability of IPC	Ensure supply distribution and proper use of face masks for all prison staff and prisoners; provide alcohol-based hand-rub dispensers on prison premises where appropriate; ensure distance from the cells by using visual signs; develop sanitisation procedure, provide practical training in sanitisation; promote hygiene inside cells and distribute hygiene materials.	Minimise risk for personnel
Communication and coordination	Share information updates with prison staff and people in prison on the state of the epidemic and preparedness plan	Reduce frustration and fear among prison staff and people in prison
Training and education	Train staff in use of PPE, hygiene and preventive measures, environmental sanitisation and cleaning measures, social distancing. Educate people in prison on personal preventive measures (social distancing, hand hygiene, cough etiquette, room cleanliness, use of mask, discouraging exchange of goods and cigarettes).	Reduce risk of transmission

COVID-19: coronavirus disease; CS: custodial staff; HCW: health workers; IPC: infection prevention and control; PCR: polymerase chain reaction; PPE: personal protective equipment.

Managing outbreaks of highly contagious diseases in prisons : a systematic review

Table 2 Summary of recommendations for managing infectious outbreaks in prison						
Recommendation	тв	Influenza	Measles, mumps, varicella	Adenovirus	COVID-19 (hypothetical impact)	
Interagency collaboration	++	*	*	*	++	
Health communication	++	*	*	*	++	
Screening for contagious diseases						
Symptoms	+	+	-	+	+ (Marginal)	
Diagnostic	+	+	+	*	+	
Immune status	-	-	++	-	Unclear	
Restrictions, isolation and quarantine	++	+	++	+	++	
Contact tracing	++	-	+	+	++	
Immunisation programmes	-	+	++	-	-	
Epidemiological surveillance	++	++	++	-	++	
Prison-specific guidelines	+	+	+	+	+	
Appropriate treatment	++	+/-	-	-	-	

Beaudry G, et al. BMJ Global Health 2020;5:e003201. doi:10.1136/bmjgh-2020-003201



Figure 2. Point estimates for active cases of COVID-19 among incarcerated persons at the twenty-fifth, fiftieth, and seventyfifth percentiles of the lagged and logged staff prevalence and county incidence of COVID-19 for pre- and post-mask mandate periods.

Don't overlook the psychological consequences of a pandemic in prisons

Psychiatry Research 303 (2021) 114107 Contents lists available at ScienceDirect Psychiatry Research journal homepage: www.elsevier.com/locate/psychres

Suicide attempts and Covid-19 in prison: Empirical findings from 2016 to 2020 in a Swiss prison

Laurent Gétaz^{a,b}, Hans Wolff^a, Diane Golay^a, Patrick Heller^a, Stéphanie Baggio^{a,c,*}



	Risk in 2020	Risk in 2016- 2019	Relative risk (95% confidence interval)
Severe suicide attempts (self- strangulation/hanging and/or	6.97/100 PLD/year	4.43/100 PLD/	1.57 (1.10; 2.04) p < .001
massive medicine ingestion)	10 50 /	year	1 57 (1 00; 1 00) -
Other types of self-narm events	12.50/	7.94/100	1.57 (1.23; 1.92) p
(cuts/scarifications and/or	100 PLD/	PLD/	< .001
ingested blunt items)	year	year	

Measures taken to prevent the occurrence of COVID-19 cases in prisons



Cien Saude Colet. 2020 Sep;25(9):3493-3502. doi: 10.1590/1413-81232020259.15682020. Epub 2020 Aug 28.

Release and re-entry into the community

Decarceration and community re-entry in the COVID-19 era

Carlos Franco-Paredes*, Nazgol Ghandnoosh*, Hassan Latif, Martin Krsak, Andres F Henao-Martinez, Megan Robins, Lilian Vargas Barahona, Eric M Poeschla

Panel: Community re-entry and reintegration policies in the COVID-19 era

Enhancing public health

- Re-entry support approaches that involve less person-to-person contact
- Avoidance of group activities
- Education of preventive interventions
- Hygiene and disinfection strategies
- Viral screening and instituting quarantine and isolation protocols when indicated, particularly at halfway houses or other dormitory-style living environments

Removing structural vulnerabilities

- Stable housing
- Food security

` (U)

- · Access to other public services
- Expanding job opportunities
- High-quality early education
- · Enhancing residential mobility

Reducing health inequities

- Access to quality medical care
- Enrolment (or re-enrolment) in Medicaid, including individuals with pre-existing conditions
- Increase access to mental health services
- · Effective treatment for substance use disorder

Permanent reductions in jail and prison populations

 Reduce incarceration to levels of other industrialised countries

> Lancet Infect Dis 2020; 21: e10–15

Points moins discutés

- Pandemic/epidemic preparedness
- Training and education
- Communication and its risks
- Means of protection
- Care of sick prisoners
- Epidemiological surveillance
- Vaccination and its effect



Others considerations

In Switzerland, discussion in progress

- Revision of the law on epidemics
- Future pandemic plan

Presentation plan

1-Multidrug-resistant bacteria

2-Pandemics

3-And Co

Controlling the spread of micro-organisms

Standard precautions (SP)

- To limit cross-transmission of microorganisms
- To ensure systematic protection of other patients, health-care staff and the care environment

Additional measures



Standard precautions (SP)

- To limit cross-transmission of microorganisms
- To ensure systematic protection of other patients, health-care staff and the care environment

Additional measures



Some bibliography

Recommandations Swissnoso

https://www.swissnoso.ch

ECDC

https://www.eurosurveillance.org

CDC

https://www.cdc.gov

Recommandations WHO

https://www.who.int

Comment interpréter ?



Danke für Ihre Aufmerksamkeit !