

ESCMID Postgraduate
Technical Workshop

**Improving Patient Safety:
the Neglected Impact
of Age and Gender**



Antibiotic prescription in nursing homes

M. Adriana Cataldo

National Institute for Infectious Diseases "L. Spallanzani"

Rome, Italy

- **High rate of antibiotic prescription**
- Antibiotics among the most commonly prescribed classes of medications

Antibiotic use in LTCFs

- In US LTCFs, **1.6 million to 3.8 million infections** occur **each year**
- Overall infection rate for endemic infections: **1.8 - 13.5** infections per **1000 resident-care days**.
- HALT2 point prevalence survey in Europe: **crude prevalence** of residents with at least one **HAI 3.4%**

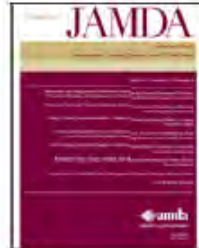
LTCF residents high risk of developing HAI



ELSEVIER

JAMDA

journal homepage: www.jamda.com



Review

Antibiotic Use and Resistance in Long Term Care Facilities

Laura W. van Buul MSc^{a,b}, Jenny T. van der Steen PhD^{a,b,*}, Ruth B. Veenhuizen MD, PhD^{a,b}, Wilco P. Achterberg MD, PhD^c, François G. Schellevis MD, PhD^{a,d}, Rob T.G.M. Essink PharmD, MPH^e, Birgit H.B. van Benthem PhD^f, Stephanie Natsch PharmD, PhD^g, Cees M.P.M. Hertogh MD, PhD^{a,b}

- Overview of literature on antibiotic use, antibiotic resistance, and strategies to reduce antibiotic resistance.
- 156 articles included (published up to 2011)
 - **antibiotic use 44**
 - antibiotic resistance 103
 - strategies to reduce antibiotic resistance 16

- USA, Canada, and Italy study period of 1 year
 - **47%-79% LTCFs residents at least 1 course of antibiotics**
- 3 studies from USA, Sweden, and Belgium
 - **77%- 88% of NHs residents with infectious episodes were prescribed antibiotics.**
- European studies:
 - point-prevalence rate 4.8% - 15.2%.

Incidence/Prevalence of Antibiotic Use

Antibiotics most commonly prescribed for

- UTIs: 32% to 66%
- RTIs: 15% to 36%
- SSTIs: 13% to 18%

ESCMID Online Lecture Library
© by author

Incidence/Prevalence of Antibiotic Use

Resident level

- use of invasive devices
- residents receiving extensive medical or rehabilitation services.

Facility level

- residents of nursing homes (13.1%) than in residents of residential care facilities (4.9%)
- facilities with more health care aides per 100 residents

Geographical level

- differences within and between countries

Factors Associated With Antibiotic Use

- Indication for antibiotic treatment
- Selection of the right drug regimen
- Selection of the right dosage
- Treatment duration

ESCMID Online Lecture Library
© by author

Appropriate use of antibiotics

- Infectious diseases diagnosis
 - atypical symptoms
 - several chronic diseases
 - hearing and speech difficulties
 - cognitive impairment
 - limited diagnostic resources

Antibiotic prescription challenges

- Medical and nursing staff
 - Different types of medical care providers: often general practitioner
 - many prescriptions without physical examination (telephone order)
 - nursing staff's assessment

Antibiotic prescription challenges

- High prevalence of bacterial colonization
 - nearly all individuals with urethral catheters have bacteriuria
 - prevalence of bacteriuria among residents without catheters: 25%-50% for women and 15%-40% for men
 - Wounds rapidly colonized by bacteria
- Samples sent to the microbiology laboratory without clinical reasons
- Positive samples might be mistaken for infections
 - unnecessary antibiotic prescriptions

Antibiotic prescription challenges

High prevalence of resistant bacteria
Lack of local resistance data

Antibiotic prescription challenges

- Lack of regular review of prescriptions: delayed de-escalation
- Difficulties in assessing antibiotics benefit
 - **Half of prescription longer than seven days**

Antibiotic prescription challenges

- **Patients and family expectations**

Antibiotic prescription challenges

38% to 51% of antibiotics in LTCFs are prescribed inappropriately

ESCMID Online Lecture Library
© by author

Infection Management and Multidrug-Resistant Organisms in Nursing Home Residents With Advanced Dementia

Susan L. Mitchell, MD, MPH; Michele L. Shaffer, PhD; Mark B. Loeb, MD, MSc; Jane L. Givens, MD, MSCE;
Daniel Habtemariam, BA; Dan K. Kiely, MPH, MA; Erika D'Agata, MD, MPH

- Prospective cohort study: 362 residents with advanced dementia and their health care proxies in 35 Boston area NHs
- Data collected on
 - suspected infections
 - use of antimicrobial agents
 - clinician counseling of proxies about antimicrobials
 - proxy preference for the goals of care
 - colonization with MDRDs (MRSA, VRE, MDR-GN)

Infection Management and Multidrug-Resistant Organisms in Nursing Home Residents With Advanced Dementia

Susan L. Mitchell, MD, MPH; Michele L. Shaffer, PhD; Mark B. Loeb, MD, MSc; Jane L. Givens, MD, MSCE;
Daniel Habtemariam, BA; Dan K. Kiely, MPH, MA; Erika D'Agata, MD, MPH

Outcome:

- proportion of suspected infections treated with antimicrobials that met minimum clinical criteria to initiate antimicrobial treatment based on consensus guidelines

66.3% of residents at least 1 suspected infection over 12 months

- urinary tract 39.5%
- respiratory tract 29.8%
- skin 13.9%
- fever with unclear source 16.7%

Suspected infections

- **72%** of **suspected infections** were **treated with antimicrobials**
- 52% of residents had at least 1 antimicrobial course over 12 months.
- **Most common antimicrobial classes prescribed:**
 - Quinolones 40%
 - Third- or fourth generation cephalosporins 21%
 - Penicillins 18%
 - First generation cephalosporins 14%

Antibiotic use

- **56%** of treated episodes **did not meet minimum criteria for antimicrobial treatment initiation**
- Most common antimicrobials used
 - **quinolones 43%**
 - **third- or fourth generation cephalosporins 19%**

(Colonisation acquisition incidence rates: MDRGNB 36%. Independent factors associated with MDRD acquisition: exposure to quinolones and 3^o-4^o-gen cephalosporins)

Inappropriate antibiotic use

Multivariable adjustment

Variables significantly associated with **minimum criteria being present:**

- **proxy counseled about antimicrobials**
- source not the urinary tract
- febrile episode
- skin infection

Antibiotic use

BMJ Open Antibiotic prescribing in long term care facilities: a qualitative, multidisciplinary investigation

Aoife Fleming,¹ Colin Bradley,² Shane Cullinan,¹ Stephen Byrne¹

Qualitative semistructured interviews were conducted with 37 healthcare professionals who work in LTCFs (10 general practitioners, 4 consultants, 14 nurses, 9 pharmacists) between December 2012 and March 2013 in Ireland

So it can be very difficult to know, you are going by a bit of guesswork, a bit of analysis of results, a bit of examination, a bit of the history from the nurse, it depends on how well the nurse knows them as well, how changed they are from their usual baseline. Then you make a decision. You probably have a lower threshold for using antibiotics in long term care facilities because of all of those factors. (GPG)



ES
© by author
Online Lecture Library

Nothing in medicine is black and white so you can't have guidelines, guidelines are just that, they are guidelines not protocols. I mean that is the difference people need to understand, protocols are something you have to stick to. (GP4)



ESMD Online Lecture Library
© by author

..the family would be insistent on them being seen by a doctor most of the time and influence the nurse to call you but once you come and see them and assess them, no it would be uncommon that they would insist on an antibiotic. (GP9)



ES
© by author
Online Lecture Library



Guidelines for infection control in nursing homes: a Delphi consensus web-based survey

K. Chami^{a,b,c,d,*}, G. Gavazzi^{a,e}, B. de Wazières^{a,f}, B. Lejeune^{a,g,h}, F. Carrat^{b,c,i},
F. Piette^{a,j}, J. Hajjar^{a,k,l}, M. Rothan-Tondeur^{a,b,c,d}

Topic 4: Organisational principles (N = 29)

MDRO surveillance	236	The facility should develop a written agreement with one or more off-site medical laboratories for testing MDRO clinical isolates such as MRSA, ESBL-producing <i>Enterobacteriaceae</i> , VRE, ceftazidime-resistant <i>Pseudomonas aeruginosa</i> , ceftazidime-resistant <i>Acinetobacter baumannii</i> (high agreement).
	237	Systematic prescreening of MRSA should not be done at admission or during the residents' stay (high agreement).
	238	The cohorting of MDRO carrier residents should be organised (high agreement).
	239	Signposts should be put up for residents colonised or infected with MDRO and requiring special contact precautions (high agreement).
Surveillance of infectious diseases	240	A system for ongoing collection of data on infections should be established in the facility to detect epidemic clustering of transmissible infections (influenza-like illness, tuberculosis, invasive <i>Streptococcus pneumoniae</i> infections, <i>Clostridium difficile</i> , viral conjunctivitis, scabies, etc.) (high agreement).
	241	An annual programme should be established in the facility for preventive actions for HAIs, including education of employees and healthcare professionals, assessment of clinical practices and surveillance (high agreement).
	242	The facility should establish a system for reporting notifiable diseases to proper public health officials (high agreement).
Education of healthcare workers	243	Employees and healthcare professionals should receive a specific education on the prevention of HAIs (high agreement).
	244	One person should be responsible for conducting infection control and prevention activities in the facility (high agreement).
	245	Knowledge when practising the profession should be measured by professional practice assessment (PPA) (agreement).
Antibiotic stewardship	246	Infection control education programmes in NHs should involve hospital infection control professionals (high agreement).
	247	Availability of clinical practice recommendations Guidelines for judicious use of antibiotics in NHs should be drafted and disseminated (high agreement).
	248	Telephone consultation for assistance for antibiotic prescribing The facility should identify one referent person to whom should be assigned the responsibility of antibiotic utilisation and appropriateness (high agreement).
Outbreak management	249	Organisational features The facility should identify one person within the facility for intervention during an outbreak (agreement).
	250	All caregivers should be educated to report any significant infectious illnesses to the staff member responsible for employee health (high agreement).
	251	The director of the facility or the medical coordinator should report epidemics to proper public health officials (e.g. influenza-like illness, tuberculosis, invasive <i>Streptococcus pneumoniae</i> , <i>Clostridium difficile</i> , <i>Legionella pneumophila</i> and scabies) (high agreement).



Published in final edited form as:

Am J Infect Control. 2008 September ; 36(7): 504–535. doi:10.1016/j.ajic.2008.06.001.

SHEA/APIC Guideline: Infection Prevention and Control in the Long-Term Care Facility

Philip W. Smith, MD, Gail Bennett, RN, MSN, CIC, Suzanne Bradley, MD, Paul Drinka, MD, Ebbing Lautenbach, MD, James Marx, RN, MS, CIC, Lona Mody, MD, Lindsay Nicolle, MD, and Kurt Stevenson, MD

Antibiotic Stewardship

1. Infection control programs in LTCFs should be encouraged to include a component of antimicrobial stewardship (Category IB).

Comment: The LTCF should encourage judicious use of antimicrobials with guidelines based in part on local susceptibility patterns. Antibiotic utilization and appropriateness may be monitored, and these data used for interventions (eg, education, antibiotic restrictions).

2. The ICP should monitor antibiotic susceptibility results from cultures to detect clinically significant antibiotic-resistant bacteria (such as MRSA or VRE) in the institution. Changes in antibiotic-susceptibility trends should be communicated to appropriate individuals and committees (Category IB).

Availability of antibiotic stewardship resources in 260 nursing homes in 17 European countries in 2009:

- **No specific guidelines** for rational use of antibiotics available in **50% of the nursing homes**.
- Few LTCFs with restricted antibiotic formulary and regular training of physicians on appropriate antibiotic prescribing

ESAC project

- **10 antimicrobial stewardship elements investigated**
 - **46% LTCFs none of these elements present**
- 76% no restrictive list of antimicrobials for prescription
- Most frequently present:
 - 'therapeutic formulary, comprising a list of antibiotics' (33.6%),
 - 'advice from a pharmacist for antimicrobials not included in the formulary' (20.7%)
 - 'written guidelines for appropriate antimicrobial use in the facility' (20%).
- Infrequently present:
 - 'data on annual antimicrobial consumption by antimicrobial class' (16.0%)
 - 'local antimicrobial resistance profile summaries' (11.0%)

HALT2 PPS

- Effectiveness of antimicrobial stewardship programs in LTCFs?
- Best intervention?

Antimicrobial stewardship in LTFC

- Systematic review on randomised controlled trials of an intervention to improve the quality of antibiotic prescribing, or increase adherence to a prescribing guideline or reduce the amount of antibiotic prescribing.
- Studies conducted in the long-term care setting.
- Search up to August 2012.
- **4 randomised controlled trials included**

The effect of interventions to reduce potentially inappropriate antibiotic prescribing in long-term care facilities: a systematic review of randomised controlled trials

- 3 studies: educational material and sessions at physicians and nurses, with 1 of the 3 studies providing prescribing feedback
- 1 study: educational material and prescribing feedback for physicians only.
- *"Due to the mixed and modest effects of the interventions and the variety of interventions implemented, it is difficult to attribute the success of any intervention to just one component alone."*
- Multifaceted intervention may improve the quality of antibiotic prescribing
 - local consensus procedures
 - educational strategies
 - locally developed guidelines
- Low quality of the evidence

The effect of interventions to reduce potentially inappropriate antibiotic prescribing in long-term care facilities: a systematic review of randomised controlled trials



Antimicrobial stewardship in long term care facilities: what is effective?

Lindsay E Nicolle

- Systematic literature search: publications describing evaluation of antimicrobial stewardship programs for LTCFs
 - Interventions included
 - education,
 - guidelines development,
 - feedback to practitioners,
 - infectious disease consultation
-

- No standardization of program components, implementation strategies, or evaluation
- Simultaneous implementation of several different program components
- Most of the studies: at least some improvements in antimicrobial use
- None describe impact of stewardship on the incidence or prevalence of antimicrobial resistance
- Outcomes were evaluated only while the program remained active
- None describe the cost or cost-effectiveness of the programs

"Current evidence is insufficient to support recommendations for a specific program, or any specific program components.....Provision of on-site infectious diseases specialty consultation may be an effective intervention, but this is likely not realistic for most facilities. It seems reasonable for programs to have flexibility for customization to address local considerations".

Table 15: Association between the prevalence of antimicrobial use and antibiotic policies

Antibiotic policy	NHs n	Prevalence of AB use (residents with an AB per 100 eligible residents)				Kruskal-Wallis test
		Mean %	Median %	Min-Max	95% CI	
Presence of a restrictive list of ABs to prescribe						
Yes	29	5.19	4.41	0.0-13.0	4.38-6.07	H: 0.69
No	82	5.27	3.93	0.0-33.3	4.78-5.79	p=0.40
Presence of an AB committee						
Yes	15	6.63	5.88	0.0-26.7	5.36-8.04	H: 0.31
No	102	5.26	4.14	0.0-33.3	4.82-5.72	p=0.58
Regular training of AB prescribers (at least once per year)						
Yes	21	6.54	4.11	1.2-33.3	5.48-7.71	H: 0.00
No	96	5.19	4.31	0.0-18.8	4.74-5.66	p=0.98
Written guidelines for appropriate AB use						
Yes	43	5.89	5.00	0.0-26.7	5.18-6.66	H: 2.07
No	74	5.17	3.80	0.0-33.3	4.66-5.71	p=0.15
Availability of annual AB consumption data						
Yes	31	7.16	5.88	0.0-33.3	6.25-8.17	H: 3.23
No	86	4.81	4.04	0.0-18.8	4.36-5.30	p=0.07
Microbiological samples taken for guidance of the best AB choice						
Yes	68	6.10	4.31	0.0-33.3	5.53-6.72	H: 1.65
No	49	4.52	4.10	0.0-14.0	3.94-5.15	p=0.20
Drug resistance profiles of the NH						
Yes	16	5.82	4.03	0.0-26.7	4.69-7.12	H: 0.01
No	101	5.37	4.17	0.0-33.3	4.94-5.85	p=0.93
Mandatory use of a motivation form to prescribe outside the local formulary list						
Yes	22	6.66	5.70	0.0-26.7	5.65-7.85	H: 1.44
No	95	5.15	4.10	0.0-33.3	4.70-5.62	p=0.23
Pharmacist's advice for the AB choice						
Yes	18	4.82	3.23	0.0-33.3	3.87-5.96	H: 2.20
No	99	5.55	4.27	0.0-26.7	5.09-6.03	p=0.14
NH therapeutic formulary including a chapter on AB therapy						
Yes	54	4.98	4.36	0.0-26.7	4.40-5.61	H: 0.05
No	63	5.83	3.91	0.0-33.3	5.24-6.45	p=0.82

- Physician education
- Feedback on prescriptions (eg, antibiotic use review by a pharmacist)
- Monitoring appropriateness of antibiotic prescribing
- Providing resources for obtaining cultures for diagnosis
- Using restricted formularies
- Using antibiotic order forms
- Limiting the use of broad-spectrum antibiotics
- Involvement of nursing staff

Elements of LTCFs antibiotic stewardship programs

- Discourage antibiotic prescribing without clinical examination
 - Up to half of all antibiotics are prescribed without a proper clinical examination in LTCFs

Practical strategies for prescription improvement

- Continuing education regarding prudent antibiotic use should be regularly performed in LTCFs
- Medical staff:
 - education on antibiotic correct use
 - feedback on prescriptions
- Nursing staff: training on
 - clinical signs suggesting bacterial infections
 - situations in which antibiotics are not needed
 - appropriate indications for microbiological investigations
 - importance of assessing daily antibiotic prescriptions
- Patients and their families
 - awareness of the risks of bacterial resistance
 - situations in which antibiotic treatment is not needed (e.g. influenza, asymptomatic bacteriuria).

Practical strategies for prescription improvement

Target areas where antibiotic misuse is common

- Unnecessary antibiotic treatments for colonization (e.g. asymptomatic bacteriuria)
- Unnecessary antibiotic treatments for urinary tract infection prophylaxis
- Unnecessary antibiotic treatments for viral infections (e.g. influenza)
- Unnecessary use of topical antibiotics
- Absence of reassessment of antibiotic therapies at around day 3
- Longer-than-necessary durations

Practical strategies for prescription improvement

- Provide surveillance data on antimicrobial susceptibility patterns in NH

Practical strategies for prescription improvement

- Rate of antibiotic prescribing
- Rate of inappropriate antibiotic use

} Unacceptably high

High rate of MDR-bacteria

- Incidence of **infections due to MDR-bacteria** likely to be **increased up to 8-times**
- Phenomenon involving both Gram+ and Gram-
- LTCFs implicated in SEVERAL outbreaks of MDRO
- **Last few years increase in the prevalence of MDR-GNB**

LTCF residents high risk of acquiring MDRO

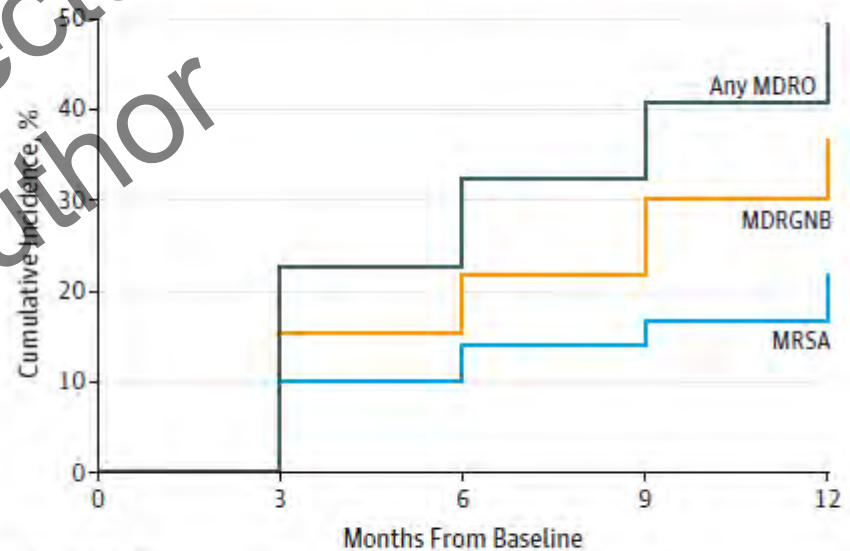
Proportion of **all residents colonized at some point over 12 months** (baseline or follow-up)

- any MDRO 67%
- MDRGNB 54%
- MRSA 27%
- VRE 0.8%

Colonisation acquisition incidence rates

- Any MDRO 48%
- MDRGNB 36%
- MRSA 21%
- Only 2 residents acquired VRE

Figure. Cumulative Incidence Rates of Resident Acquisition of Drug-Resistant Organisms During the Study Period



Participants at risk, No.	0	3	6	9	12
Any MDRO	175	116	93	71	61
MDRGNB	200	145	124	93	85
MRSA	278	218	184	160	151

MDRO

- Unadjusted analysis: greater (measured both as > 1 day of treatment and higher logDOT/1000-residents days), quinolone and 3^o-4^o-gen cephalosporin use: significantly associated with MRDO acquisition
- After adjusting for Foley catheters and hospitalization in the prior 90 days, **significantly associated with MRDO acquisition.**
 - **greater exposure to quinolones**
 - **greater exposure to 3^o-4^o-gen cephalosporins**

Role of antibiotic exposure on MRDO acquisition

Multidrug-Resistant Gram-Negative Bacteria in a Long-Term Care Facility: Prevalence and Risk Factors

Aurora Pop-Vicas, MD, MPH,* Susan L. Mitchell, MD, MPH,† Ruth Kandel, MD,† Robert Schreiber, MD,† and Erika M. C. D'Agata, MD, MPH*

Table 1. Risk Factors Associated with Multidrug-Resistant Gram-Negative Bacilli (MDRGN) Colonization in Long-Term Care Facility Residents

Risk Factor	Subjects	Subjects not	P-Value
	Colonized with MDRGN n = 43	Colonized with MDRGN n = 41	
	n (%)		
Aged <87	22 (51)	26 (63)	.26
Male	5 (12)	8 (20)	.31
Charlson score ≥3	25 (58)	18 (56)	.85
Dementia	37 (86)	30 (73)	.15
Advanced dementia	29 (65)	16 (36)	.009
Activity of daily living score ≥4	32 (74)	25 (61)	.19
Nonambulatory	41 (95)	31 (76)	.01
Pressure ulcer	14 (33)	8 (20)	.17
Draining wound	5 (12)	1 (2)	.10
Fecal incontinence	39 (91)	29 (71)	.02
Residing on Unit B or C	30 (64)	17 (36)	.009
≥14 days antibiotic exposure*	26 (60)	15 (37)	.03
≥1 prior hospitalizations*	8 (19)	6 (15)	.63

* During the 12 months before study enrollment.

J Antimicrob Chemother 2012; **67**: 2982–2987
doi:10.1093/jac/dks300 Advance Access publication 3 August 2012

**Journal of
Antimicrobial
Chemotherapy**

**Epidemiology and genetic characteristics of extended-spectrum
 β -lactamase-producing Gram-negative bacteria causing
urinary tract infections in long-term care facilities**

Marco Tinelli¹, Maria Adriana Cataldo^{2*}, Elisabetta Mantengoli³, Chiara Cadeddu⁴, Ettore Cunietti⁵,
Francesco Luzzaro⁶, Gian Maria Rossolini^{3,7} and Evelina Tacconelli⁸

Risk factors for ESBL+ GN UTIs

- Previous antibiotic therapy (OR 4)
- Presence of a urinary catheter (OR 15)
- **Highest risk:** exposure to ≥ 7 days of quinolones and cephalosporins (OR 7), after adjusting for type, dosage and duration of antibiotic

Risk factors for ESBL- GN UTIs

- Previous surgical procedures (OR 2)
- Presence of a urinary catheter (OR 8)
- No specific antibiotics significant risk for UTIs after adjusting for demographic and clinical risk factors

Logistic regression analysis

ORIGINAL ARTICLE

Carbapenem-Resistant *Klebsiella pneumoniae* in Post-Acute-Care Facilities in Israel

Debby Ben-David, MD;¹ Samira Masarwa, MA;¹ Shiri Navon-Venezia, PhD;¹ Hagit Mishali, MA;¹ Ilan Fridental, MD;¹ Bina Rubinovitch, MD;¹ Gill Smollan, MD;¹ Yehuda Carmeli, MD;¹ Mitchell J. Schwaber, MD¹;
Israel PACF CRKP (Post-Acute-Care Facility Carbapenem-Resistant *Klebsiella pneumoniae*) Working Group¹

- A cross-sectional prevalence survey in 12 post-acute-care facilities (PACFs) in Israel to assess the prevalence of and risk factors for carbapenem-resistant *Klebsiella pneumoniae* (CRKP) carriage among PACFs patients
-

ESCMID Online Lecture Library
© by author

- 26% skilled nursing care ward
- 12% chronic mechanical ventilation ward
- 10% subacute ward
- 2.5% rehabilitation ward

CRKP prevalence by ward

- Type of LTCF important determinant of the risk of acquiring MDR bacteria
- Results of **nested case-control** study **matching cases to controls by ward** identified **previous antibiotic exposure** and colonization with other multidrug-resistant organisms as **independent risk factors for CRKP colonization**

Risk factors for CRKP colonisation



ELSEVIER

JAMDA

journal homepage: www.jamda.com



Review

Antibiotic Use and Resistance in Long Term Care Facilities

Laura W. van Buul MSc^{a,b}, Jenny T. van der Steen PhD^{a,b,*}, Ruth B. Veenhuizen MD, PhD^{a,b},
Wilco P. Achterberg MD, PhD^c, Francois G. Schellevis MD, PhD^{a,d}, Rob T.G.M. Essink PharmD, MPH^e,
Birgit H.B. van Benthem PhD^f, Stephanie Natsch PharmD, PhD^g, Cees M.P.M. Hertogh MD, PhD^{a,b}

- < 0.3% of the MEDLINE and EMBASE publications on antibiotic use and antibiotic resistance focus on LTCFs

- Trials on antimicrobial stewardship with standardised outcomes
- Trials on long-term effect of antimicrobial stewardship
- Studies on impact of antimicrobial stewardship on incidence/prevalence of antimicrobial resistance
- Data on association between antibiotic exposure and antibiotic resistance
- Cost-effectiveness of programs

Need for research

- More economical resources for LTCFs and NHs
- Tailored strategies
- Multidisciplinary management
- Education, education, education....(physicians, nurses, patients and families)

Need for practice
