

Prof. Dr. Christian Ruef
Spitalhygiene HAL 14C, Klinik
für Infektionskrankheiten
und Spitalhygiene
Universitätsspital Zürich
Rämistrasse 100
8091 Zürich
christian.ruef@dim.usz.ch

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Assessment of antibiotic use and antibiotic resistance in long-term care facilities

Objectives Little is known about the prevalence of nosocomial infections, the use of antibiotics, and antibiotic resistance in long-term care facilities (LTCFs) in Switzerland and their role in promoting the emergence of antimicrobial resistance. Research on this question is vital, for the elderly segment of the population continues to grow and because a better understanding of the causes leading to antibiotic resistance will allow us to improve the use of antibiotics.

Conclusions Long-term care facilities (LTCFs) have particular problems regarding antibiotic resistance that differ from the problems encountered in acute care hospitals. This difference is mainly due to two factors – namely, the often very long stay of the patients in these units, and the often relatively high degree of dependency of the patients. This results in frequent infections and an increased risk for cross-transmission of nosocomial pathogens. In fact, the study showed that antibiotic use was not the driving force for the increase of antibiotic resistance. This increase was the result of the spread of several clones of *E. coli* with resistance to one or several antibiotics among the residents of the LTCF investigated. An additional finding of the study was the recognition that MRSA or VRE are not commonly found to colonize or infect patients in this LTCF. Based on these interesting findings, the main emphasis regarding the control and reduction of antibiotic resistance in such facilities should be the prevention of spread through implementation of new or improved infection control measures (improve compliance with hand hygiene, improve diagnostic efforts in the workup of patients with suspected urinary tract infections, etc.). In particular, the establishment of a simplified nosocomial infections prevalence or incidence surveillance system that can be used in many LTCFs is highly recommended. This would allow comparisons between institutions and also the monitoring of resistance rates and the prevalence of pathogens with particular resistance patterns such as MRSA or ESBL (Extended-Spectrum β -Lactamase) producing bacteria.

Main results and findings

The results of the project in a single LTCF showed clearly that the occurrence of nosocomial infections in residents of facilities of this kind is very common. In fact, during their often long stays, up to 50% of the patients develop one or several nosocomial infections, in particular:

- Infections of the urinary tract account for the majority of these infections, followed by infections of the lower respiratory tract.
- As a result of these infections, antibiotic use was also high in this setting. Fluoroquinolones accounted for more than 40% of antibiotics used.
- Interestingly, resistance of *E. coli* to quinolones was relatively low (2.3% for ciprofloxacin, 9.2% for norfloxacin), whereas resistance to cotrimoxazole was present in 39.7% of *E. coli* isolated from the urine in these patients.
- No positive correlation between exposure to antibiotics and prevalence of resistant strains in patients hospitalized on individual wards was found.
- No correlation between antibiotic use and resistance rate was found; hence empirical antibiotic treatment in LTCFs is justified.
- A significant correlation between presence and spread of antibiotic resistant clones and resistance rates on individual wards was found. Thus clonal spread of antibiotic resistant strains is an important driving force of antibiotic resistance in LTCFs.

Recommendations for LTCFs The study has shown that surveillance of nosocomial infections, antibiotic use and antibiotic resistance in LTCFs is feasible, if the necessary resources are made available from outside institutions, as was the case during this particular research project. Since for this study the data collection forms were relatively detailed, in order to allow a more simple surveillance activity, these forms would need to be adapted. The key recommendations are:

- Establish and/or strengthen infection control activities in LTCFs.
- Cantons or cities that are in charge of LTCFs should develop a plan for the implementation of basic infection control guidelines in these institutions.

- Compliance with hand hygiene is crucial in controlling and reducing the problem of spread of nosocomial pathogens and therefore has to be improved. Compliance can be improved through training of personnel and better availability of disinfectant products.
- Diagnostic efforts in the workup of patients with suspected urinary tract infections have to be improved, i.e. by requiring and conducting urinary cultures and sensitivity testing in all patients prior to the empiric start of antibiotics.
- While this enhanced diagnostic effort would certainly have a negative impact on the budget of these institutions, it might be possible to reduce costs for antibiotics if treatment can be adapted based on the culture result. Whether or not this strategy would also have a positive impact on the incidence of recurrent urinary tract infections requires further study.
- Finally, a simplified nosocomial infections prevalence or incidence surveillance system that can be used in many LTCFs should be established. This would allow comparisons between institutions and also the monitoring of resistance rates and the prevalence of pathogens with particular resistance patterns such as MRSA or ESBL-producing bacteria.

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