Abstract
Staphylococcal infections: penicillin susceptibility testing, clinical presentation and treatment options.

Background
Staphylococci cause a large diversity of infections, ranging from skin infections to endocarditis and prosthetic joint infections. *Staphylococcus aureus* is one of our most common causes of blood stream infections, with approximately 600 cases each year in Skåne. *Staphylococcus lugdunensis* is less common but cause the same kind of infections as *S. aureus*.

In Sweden, cloxacillin is the standard treatment for staphylococcal infections. However, cloxacillins have many disadvantages, such as high protein binding, liver toxicity and vessel irritation.

Aim
- To evaluate methods for penicillin susceptibility testing in *S. aureus* and *S. lugdunensis* and to quantify the proportion of susceptible isolates in Skåne.
- To describe the clinical presentation of *S. lugdunensis* endocarditis.
- To investigate the effective serum concentration of cloxacillin in clinical samples.
- To study the outcome of *S. aureus* bacteremia when treated with penicillin compared with cloxacillin.

Methods
The first two studies are laboratory work using different methods for penicillin susceptibility testing, including disc diffusion, zone edge appearance, E-test, clover-leaf test and PCR, to evaluate the accuracy of the methods and also to describe the prevalence of penicillin susceptible isolates in *S. aureus* and *S. lugdunensis*.

The third study is a retrospective study on *S. lugdunensis* endocarditis, using data from the Swedish Registry for Infectious Endocarditis to describe the clinical manifestations. In the fourth and fifth study, serial plasma samples will be collected from patients treated with cloxacillin, and the concentrations of active cloxacillin will be investigated with a microbiological method and mass spectrometry. A Monte Carlo simulation will be performed to determine the cloxacillin concentration in blood after given doses.

The sixth work is a retrospective journal study comparing the outcome of *S. aureus* infections treated with penicillin G and cloxacillin.

Preliminary Results
Approximately 30% of *S. aureus* and 67% of *S. lugdunensis* are susceptible to penicillin G in Skåne. There are reliable methods for penicillin G susceptibility testing. *S. lugdunensis* seems to cause an aggressive form of endocarditis but does not need surgery as frequent as previously described.
Significance
Susceptibility testing for penicillin in *S. aureus* is now in clinical practice and treatment with penicillin is recommended when susceptible.

Published works


In manuscript
Endocarditis with *S. lugdunensis* in Sweden, a retrospectively cohort study.