

NEWS FROM IDF MEMBER COUNTRIES

DENMARK

Clinical mastitis due to NAS infections does not require systemic treatment: how we can reduce the use of antibiotics

Bacteriological cure rates of clinical mastitis cases caused by NAS are similar after local and combined (local plus systemic) penicillin treatment while the amount of antimicrobial compound used differs by factor 16.

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UN SDGs



Summary

Location: Jutland, Denmark

IDF Welfare Action Area: Health management

Resource based measure:

Mastitis is a major problem in modern dairy herds. Antimicrobials used for mastitis therapy can potentially be reduced with the right treatment strategy. However, the effects must carefully be evaluated.

Animal based measure:

If local treatment is as effective as systemic treatment for clinical mastitis, side effects that are more common in systemic treatments may be reduced.

"Recent research indicates that subclinical non-aureus staphylococci infections are or short duration indicating that antimicrobial treatment may not be justified."

Line Svennesen

The aim of the study was to evaluate bacteriological cure of clinical mastitis cases treated (A) for 3 days locally (Procaine benzylpenicillin) compared to (B) 3 days of local (Procaine benzylpenicillin) plus systemic treatment (Penethamate hydroiodide). Here, we present the results for bacteriological cure on species level for NAS infections.

MATERIALS AND METHODS

In a randomized clinical trial, non-severe clinical mastitis cases caused by Gram-positive bacteria from 12 Danish dairy herds received either treatment A or B. Further, all cows received Ketoprofene. Cases were selected based on an on-farm test. Treatment effect, defined as bacteriological cure, was evaluated for all clinically cured quarters based on follow-up milk samples after 2 and 3 weeks. Standard microbiology (following NMC guidelines) and MALDI-TOF MS

were carried out on milk from the clinical case and both follow-up samples. Mixed infections were defined by 2 species. Treatment effect on cure-rates was assessed in a multivariate mixed logistic regression model.

STAPHYLOCOCCUS CHROMOGENES AND STAPHYLOCOCCUS HAEMOLYTICUS WERE THE SPECIES MOST ISOLATED

Of 345 clinical mastitis cases with follow-up records, NAS were isolated and identified to the species level in 40 and 56 cases of pure and mixed culture, respectively. The most frequent isolated NAS from pure cultures were *Staphylococcus chromogenes* and *Staphylococcus haemolyticus* (Table 1). The predicted probabilities of bacteriological cure from NAS isolated in pure culture was 84% (95% CI: 65-94) for treatment A and 86% (CI: 69-94) for treatment B (Figure 1). NAS isolated from mixed cultures had a lower predicted probability of cure at 75% (CI: 58-87) and 77% (CI: 62-88) for treatments A and B, respectively.

LOCAL BACTERIOLOGICAL TREATMENT, AS EFFECTIVE AS SYSTEMIC APPLICATION

The bacteriological cure rates for NAS infections did not differ significantly between local and combined treatment of clinical mastitis (Figure 1). Treatment with penicillins could therefore be limited to local treatment only, as every use of antibiotics increases the risk of antimicrobial resistance and systemic treatment consumes larger amounts of

HOW TO TREAT NON-AUREUS STAPHYLOCOCCI?

Prudent use of antimicrobial substances is one important measure to combat the development of antimicrobial resistance. While in Denmark generally only simple penicillins can be used for the treatment of clinical mastitis cases, most treatments of clinical mastitis cases consist of a combined local plus systemic treatment (Wilm, 2021). To date, only a single study (Kalmus, 2014) compared bacteriological cure rates of penicillins administered either local or systemic for treatment of clinical mastitis, and it remains unknown which treatment should be chosen for clinical mastitis cases due to infections with non-aureus Staphylococci (NAS).

Species	Pure culture (n=40 cases, 40 isolates)		Mixed infections (n=56 cases, 63 isolates)	
	Total	Cured (%)	Total	Cured* (%)
<i>Staphylococcus capitis</i>	0	-	1	1 (100)
<i>Staphylococcus chromogenes</i>	13	11 (85)	17	12 (70)
<i>Staphylococcus epidermidis</i>	2	2 (100)	10	7 (70)
<i>Staphylococcus equorum</i>	2	2 (100)	10	6 (60)
<i>Staphylococcus gallinarum</i>	2	1 (50)	1	1 (100)
<i>Staphylococcus haemolyticus</i>	10	8 (80)	5	4 (80)
<i>Staphylococcus hominis</i>	0	-	1	1 (100)
<i>Staphylococcus hyicus</i>	1	0 (0)	1	1 (100)
<i>Staphylococcus sciuri</i>	3	3 (100)	10	9 (90)
<i>Staphylococcus simulans</i>	5	5 (100)	0	-
<i>Staphylococcus succinus</i>	0	-	4	3 (75)
<i>Staphylococcus xylosus</i>	2	2 (100)	3	3 (100)
Total	40	34 (85)	63	48 (76)

* considered cured for the respective organism, if *Staphylococcus* sp. was isolated in follow-up samples, the NAS was considered not cured (due to uncertainty)

Table 1 – NAS species identified and cured in either pure culture or mixed infection.

antibiotic compound. It remains unclear if bacteriological cure rates after treatment significantly exceed spontaneous cure rates. Earlier research estimated spontaneous cure rates at 55-60% (Pinzón-Sánchez, 2011). However, recent research shows that at least subclinical NAS infections often have short durations indicating that antimicrobial treatment might not be justified (Woudstra, 2022).

Further research is necessary to explore if there is a benefit of treating clinical mastitis cases due to NAS infections compared to spontaneous cure. Furthermore, the role of mixed infections with regards to the cure rate of NAS should be investigated, as the cure rate for these were found lower than those for pure NAS infections. Combined treatment was not found to be significantly different from local treatment with penicillins only, therefore combined treatments for NAS infections should be discouraged.

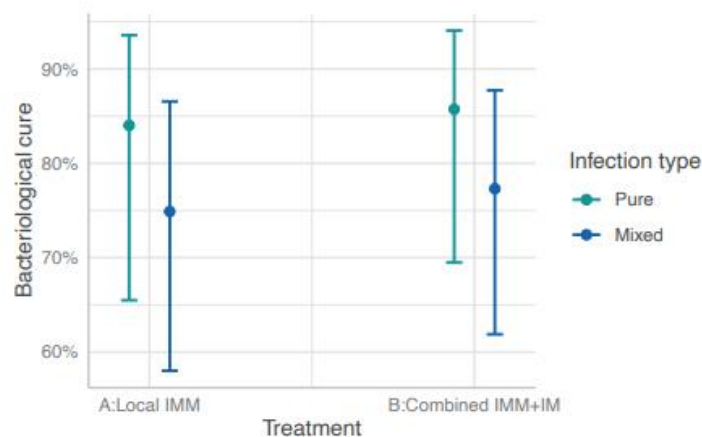


Figure 1 – Predicted probabilities of bacteriological cure

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