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SHARING EXPERTISE

SUMMARY OF THE PUBLICATION

Integrated MRSA management (IMM) with prolonged decolonization treatment after hospital discharge is effective: a single-centre, non-randomized, open-label trial

Jahn et al., Antimicrobial Resistance and Infection Control (2016) 5:25

While MRSA decolonization is increasingly recommended, also in national guidelines, for the prevention of nosocomial transmissions, it has so far remained unclear which decolonization protocol is the most effective. A critical parameter for successful decolonization is the number of treatment days. A complete procedure typically requires up to 22 days of treatment, which is longer than the average hospital stay. To overcome this limitation "integrated MRSA management" (IMM) with polyhexanide-based products was introduced in a German hospital. The study team designed a protocol to extend the procedure to outpatient and domestic settings in order to evaluate the efficiency of the IMM concept.

STUDY DESIGN

A prospective, single-centre controlled, non-randomized, open-label study conducted in Germany between 2007 and 2009. This study obtained ethics committee approval and adhered to the principles of Good Clinical Practice.

Primary study objective

The aim of the study was to assess whether the IMM strategy is:

1. a successful procedure for MRSA decolonization,
2. comparable with the success rates of inpatient decolonization only.

Secondary study objective

The goal was to assess the effect of the MRSA status of skin alterations (e.g. wounds or catheter entry sites) on decolonization rates.

METHODS

Figure 1 describes the study concept with inclusion and exclusion criteria of the two study groups as well as the treatment procedure.

The MRSA status was determined by a series of swab samples taken from the nostrils, oral cavity/throat, ears/hairline and abdomen/groin as standard locations (= one sample series) and from representative skin alterations if applicable (e.g. wounds and catheter entry sites).

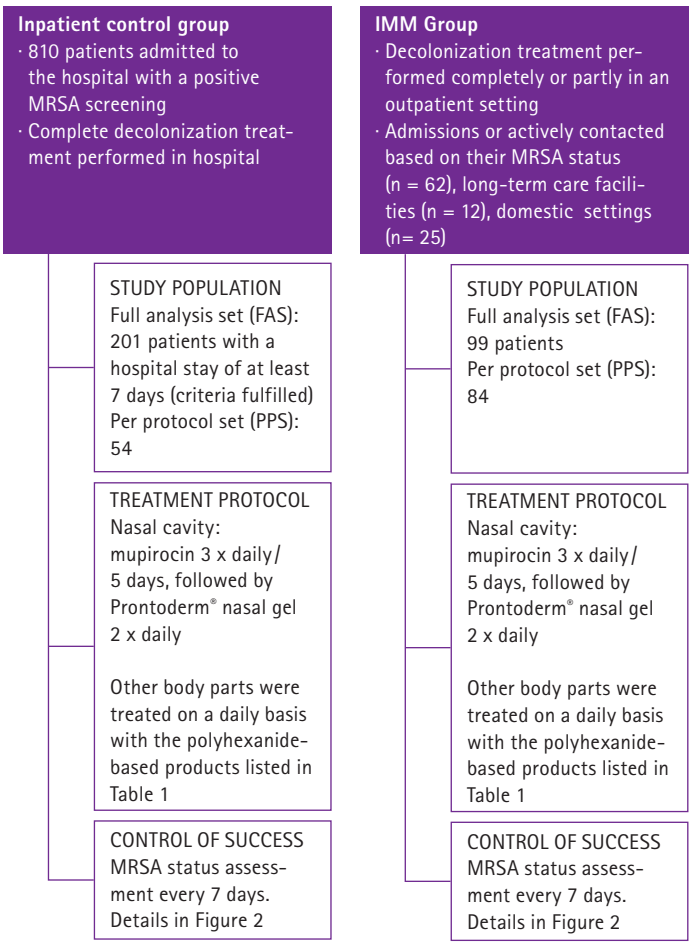

Figure 1: Summary of the study concept

Polyhexanide-based products used for decolonization

	Decolonization site
ProntOral®	throat, mouth wash
Prontoderm® Nasal Gel	nose
Prontoderm® Solution/Foam	whole-body/hair washing, external auditory canal (solution only)
Prontosan® Solution	wound irrigation

Table 1: Overview products used for decolonization

All decolonization and wound care procedures were performed in accordance with national recommendations, accompanied by daily disinfection of items involved in patient's personal hygiene and of surfaces in the patient's immediate surroundings, a daily change of bed linen, as well as a change of clothing each time the patient was washed.

According to national guidelines, an MRSA decolonization procedure is successful when 3 consecutive sets of negative MRSA samples have been obtained (Figure 2). Patients with MRSA-positive samples received a maximum of three decolonization (7 days each). Depending on the number of decolonization treatments required (1 – 3), the procedure was completed in 11 to max. 25 days.

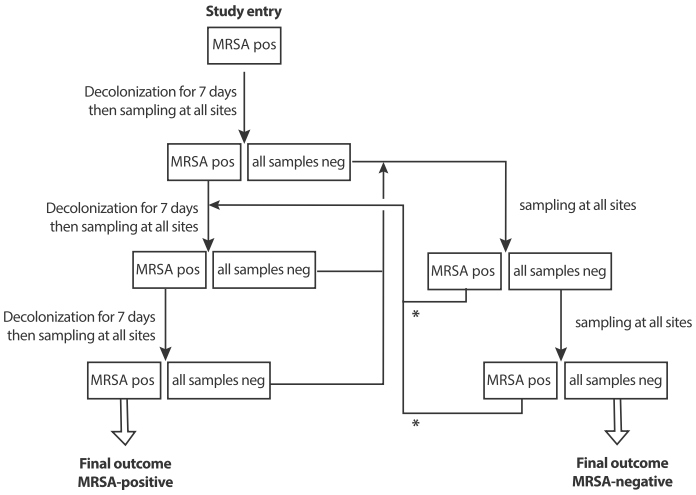

Figure 2: Schematic diagram of the MRSA decolonization procedure.

RESULTS

The outcome of the IMM group and control group can be compared as no significant differences were found in the demographics of study participants.

Overall decolonization results

The results were differentiated between the complete patient groups (FAS = full analysis set) and a second group adjusted to patient populations with completed decolonization protocols and microbiological follow-up (PPS = per protocol set) (see Figure 2). Patient groups were further categorized based on the presence of skin alterations.

The effect was analyzed of several parameters such as age, gender, length of stay (LOS), readmission, days of decolonization, baseline status of nostrils, hairline/ears, and oral cavity, plus status at multiple sites.
One interesting finding was that decolonization success decreased with increasing patient age.

Although a longer LOS resulted in a higher percentage of decolonized patients, the result was not significant. However, mean duration of decolonization was 13.6 days for the IMM group and 10.7 days for the control group. Decolonization treatment was successful after an average of 7.5 days for IMM patients and an average of 7.4 days in the control group.

The decolonization outcome for the FAS was significantly better in the IMM intervention group than in the control group. While 47 % became MRSA-free in the IMM group, the figure was only 12 % in the control group.
A significant difference could also be observed between the subgroup with skin alterations (IMM 32 %; control 12 %) and the subgroup without skin alterations (IMM intervention group 69 %; control 12 %).

Due to a marginal calculation error [(+/-1) in the number of patients] in the publication, the study team advised us to use the numbers for the PPS group from Figure 3A (see next page). Table 3 (of the original paper) will therefore not be discussed in detail. This error does not affect the overall conclusion but may irritate the reader.

The overall analysis of the PPS group resulted in similar success rates for both groups (IMM intervention group 55 %; control 43 %). Despite a higher rate for the IMM group, the difference was not significant, but indicates that the continuation of IMM treatment after discharge can be as effective as when performed within the hospital. The subgroup "without skin alterations" even achieved 75 % decolonization success.

Adhering to the IMM concept can result in a decolonization rate of 75 % (per protocol analysis) in MRSA carriers without skin alterations.

Both groups (IMM and inpatient) were analyzed to see whether there is a difference in decolonization success between patients with one or more than one proven positive MRSA site. Interestingly, the IMM group did not show any differences in success between the two groups whereas the control group did not have a single patient with more than one positive site who could be successfully decolonized ($p < 0.05$). It appears that patients who have been proven to be MRSA-positive at more than one body site can be decolonized at home but not in hospital.

Decolonization results with skin alterations

The secondary outcome focused on the influence of skin alterations. The overall analysis has already shown that a comparison within the IMM population between patients with and without skin alterations resulted in a significantly better decolonization rate for the latter ($p < 0.01$).
Patients without skin alterations achieved a success rate of 67 % in the whole PPS group (Figure 3) and of 75 % eradication in the IMM patients.
To describe the effect of skin alterations the analysis was conducted with the PPS group (N = 138) irrespective of location (hospital N = 54, after discharge N = 84).

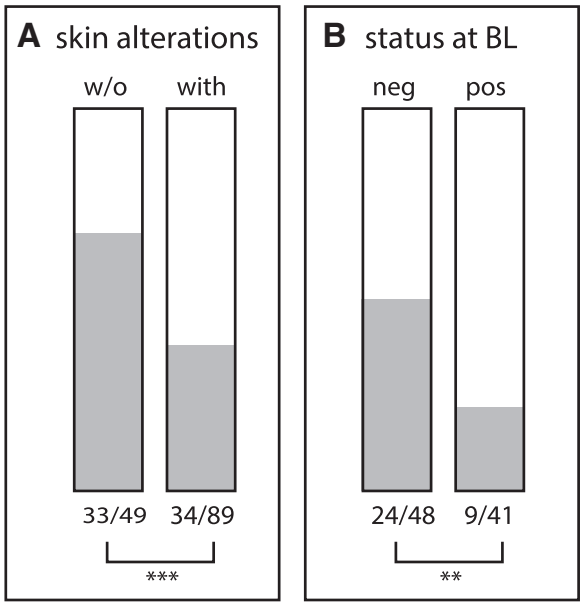

Figure 3: Effect of skin alterations on success rate of decolonization. Panel (a) shows the effect of absence or presence of skin alterations for PPS patients (intervention group and inpatient control group combined) upon admission. Panel (b) shows the effect of MRSA status on skin alterations at baseline. (Significance **p< 0.01 and ***p < 0.001)

MRSA-colonized patients with MRSA-free wounds achieve a a decolonization success rate of 50 %

The presence of skin alterations has been recognized as a contraindication for decolonization. The present data indicate that MRSA carriers with MRSA-free wounds can be decolonized with a success rate of 50 %. These results underline the importance of wound care in MRSA management.

Appropriate wound care is essential for successful MRSA management

Conclusions

As resistances have developed, alternatives to chlorhexidine and the appropriate efficacy data are urgently required. Relatively few studies exist to date regarding MRSA decolonization with polyhexanide, a product recommended for treating critically colonized, infected and chronic wounds.

Recently published results of a randomized double-blind placebo-controlled clinical trial conducted with polyhexanide (Landelle et al., 2016) reached a disappointing decolonization rate of 33.8 %. In the study, treatment was performed for 7 days, and successful decolonization was defined by negative samples at the end of treatment.
Jahn et. al. believe that a single polyhexanide-based decolonization course can be insufficient for MRSA-positive patients. The data presented in this summary supports this assumption.
Furthermore, although the placebo-group received a product without polyhexanide, another ingredient in the placebo formulation was shown to have an unexpected anti-staphylococcal activity, which might have reduced the difference observed between treatment and placebo group.

The successful MRSA decolonization rate of over 50 % seen in the IMM PPS group, and even even the 75 % rate in the subgroup without skin alterations, indicates that polyhexanide-based MRSA decolonization treatment provides a suitable approach to eradicate MRSA.
The outcome of the study presented in this summary provides proof of concept for a new and effective MRSA decolonization strategy with a multi-modal approach using a a polyhexanide treatment kit.
According to the concept presented above, successful completion of decolonization treatment at home appears promising as the average hospital stay is often too short to allow the desired outcome to be achieved.

Decolonization at home based on the IMM concept appears to be very promising given that hospital stays are often too short to allow the desired outcome to be achieved.

The study team was even able to disprove the commonly held prejudice that patients with skin alterations cannot be decolonized. Although this fact has an impact on success rates, up to 50% of MRSA-colonized patients can still be decolonized.
It appears clear at all events that the MRSA status of a skin alteration is one of the keys to successful decolonization as part of a multi-modal approach to infection prevention, including wound care, in a modern hospital setting.

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