



GUIDELINES TO CONTROL THE SPREAD OF MRSA

A. INTRODUCTION

Staphylococcus aureus is one of the most important microbial agents causing community-acquired and nosocomial infections. Serious problem in treating these infections is resistance of *S. aureus* to methicillin (methicillin-resistant *S. aureus* - MRSA), which in clinical terms means resistance to all beta-lactam antibiotics. It is estimated that 30 – 40% of patients colonized with MRSA will subsequently develop infection. Treatment of MRSA infections is difficult since the antibiotics still active against MRSA are not as efficient as antistaphylococcal penicillins or other beta-lactam antibiotics. Nowadays the majority of MRSA isolates are also resistant to several other groups of antibiotics (e.g. fluoroquinolones, aminoglycosides, clindamycin, trimetoprim/sulphamethoxazol) therefore vancomycin is usually used to treat MRSA infections. Frequent use of vancomycin has caused increased resistance of microorganisms to vancomycin. First report of vancomycin-intermediately resistant *S. aureus* (VISA) was published in 1996. In 2002 vancomycin-resistant *S. aureus* (VRSA) was isolated from clinical specimen. Another consequence of increased use of vancomycin was selection of vancomycin-resistant enterococci (VRE).

Treatment of MRSA infections is less efficient, longer and more expensive than treatment of infections caused by *S. aureus* sensitive to methicillin (MSSA). For treatment of VISA and VRSA infections new antimicrobials are being developed. Unfortunately new antimicrobial agents of quinolone, streptogramin and oxazolidinone class don't provide substantial improvement of survival in patients with serious infections caused by VISA or VRSA.

In the last three decades MRSA has caused immense problems in hospitals throughout the world. MRSA spreads primarily by direct contact via hands of health-care workers (HCW). Therefore the prevalence of MRSA in individual hospital is a good indicator of quality of hand hygiene and effectiveness of infection control program to prevent the spread of MRSA and other epidemiologically important microorganisms.

B. BASIC MEASURES

1. Regular surveillance
2. Regular and correct hand disinfection
3. Screening of patients upon admission to the
4. Adequate placement of patient colonized or infected with MRSA
5. Decolonization of patients with MRSA
6. Appropriate treatment of MRSA infections
7. Appropriate transportation and discharge of patients colonized or infected with MRSA
8. Prudent use of antibiotics
9. High standard of aseptic techniques
10. High standard of cleaning and maintenance of rooms and equipment
11. Appropriate handling of waste
12. Appropriate handling of bed linen and other textiles
13. Screening of HCWs when indicated
14. Regular audits of infection control program execution
15. Education of HCWs, patients and their relatives and visitors

B 1. Regular surveillance

MRSA can easily spread in the hospital, therefore early detection of patients colonized or infected with MRSA by screening of patients on admission is essential for successful prevention of intrahospital spread of MRSA.

Early detection includes:

- a. Screening of patients with risk factors for colonization or infection with MRSA. Risk factors are determined by Infection Control Team (ICT) and the list of risk factors is updated as required (Appendix B).
- b. Obligatory statement of colonization with MRSA in discharge papers which facilitates detection of MRSA colonized patients on re-admission. For this purpose code **Z22.3** is used.
- c. Fast and reliable microbiological diagnostics procedures.
- d. Early notification of health-care team caring for the patient colonized or infected with MRSA.
- e. Visible mark of MRSA colonization in patient's electronic file.

B 2. Regular and correct hand disinfection

Appropriate hand hygiene of HCWs is the most important, simplest and the cheapest measure for prevention of MRSA spread in the hospitals. Hand washing is performed only when hands are visibly soiled with organic or anorganic material. In all other situations hand disinfection is performed. Detailed information on appropriate application and execution of hand hygiene is available in Recommendations for appropriate performance of hand hygiene at University Clinic of Respiratory and Allergic Diseases Golnik. To ensure high rate of compliance with aforementioned recommendations it is important that:

- a. appropriate alcohol hand rub which corresponds to technical requirements as well as personal preferences and needs of the staff is provided
- b. adequate number of alcohol hand rub containers is placed wherever needed and recommended (at bedside, on working areas and carts, beside the room entrance/exit)
- c. continuous education of HCWs
- d. audits of performance of hand disinfection
- e. someone's attention is drawn to the faults in hand hygiene and that those faults are immediately corrected

B 3. Screening on admission (Appendix B)

MRSA can colonize different parts of the body: nose, throat, axillae, inguinal and perineal area, etc. Sensitivity of different collection sites varies substantially so it is wise to choose for screening purposes samples which alone or in combination allow detection of more than 90% of patients colonized with MRSA. Choice of screening samples is done by ICT through surveillance of admitted patients in certain limited period of time. Screening samples should be obtained in less than **72 hours** after patient's admission to the hospital. Screening samples are obtained from:

- a. all patients with risk factors determined by ICT (Appendix B)
- b. all patients admitted to the ICU
- c. all patients who stayed for more than 3 days in the same room as undetected MRSA colonized

The responsibility for adequate screening process lies with the attending clinician and the head nurse of the ward. The responsibility for appropriate execution of Infection Control Program lies with the chief of staff of each ward.

B 4. Adequate placement of patients colonized with MRSA (Appendix C)

Patients known or suspected to be colonized or infected with MRSA are placed in a single room. If single room is not available cohorting of MRSA colonized patients is employed. If cohorting is not possible and MRSA colonized patient has to be placed in the same room as uncolonized patient we have to assure at least 1 meter of distance between furniture and personal belongings of colonized and uncolonized patient. All recommendations of contact isolation and use of barrier precautions should be performed when caring for MRSA colonized patient. Detailed information on contact isolation and use of barrier precautions is available in Recommendations for Isolation of Patients in University Hospital of Respiratory and Allergic Diseases Golnik. For summed up recommendations about caring for patients colonized with MRSA refer to Appendix C. Contact isolation and use of barrier precautions are abolished when the patient has been successfully decolonized (MRSA negative results for all samples collected three times in 2 days interval after conclusion of decolonization) or treated for infection or suspicion of MRSA colonization has been dismissed.

B 5. Decolonization of patients (Appendix D)

Successful decolonization enables us to diminish the reservoir of MRSA in the population. Through decolonization procedure MRSA is removed from the skin and mucous membranes of the patient or at least the concentration of MRSA is diminished. When patient is successfully decolonized the possibility of subsequent MRSA infection is removed. Success of decolonization is more likely if there are no wounds or fistulae present and no intravascular or urinary catheters, endotracheal tubes inserted. Decolonization procedures are depicted in Appendix D. A diary of performed decolonization should be kept (Appendix E). Success of decolonization is determined with control samples obtained three times in two days interval between collections.

B 6. Treatment of infections with MRSA

MRSA strains are usually multiply resistant to different groups of antibiotics therefore in-vitro sensitivity to different non-beta-lactam antibiotics (fluoroquinolones, macrolides, clindamycin, fucidic acid, streptogramins, oxazolidinone) should be determined for each MRSA isolate. For mupirocin minimal inhibitory concentration (MIC) should be determined.

Antibiotics which should be tested in-vitro and can be used for treatment of MRSA infections are:

- vancomycin (Edicin®, Vancocin®) – 1,0 g (IV) q12h
- teicoplanin (Targocid®) – 6 – 12 mg/kg/d (IV / IM) (usually 400 mg IV/ IM) q24h
- quinupristin/dalfopristin (Synercid®) – 7,5 mg/kg (IV) q8h
- linezolid (Zyvoxid®) – 600 mg (PO / IV) q12h
- fucidic acid (Fucidin®) – 0,5 g (PO / IV) q8h
- rifampicin (Arficin®) – 300 mg (mild infections) or 600 mg (severe infections)(PO / IV) q12h (**not to be used as monotherapy!**)

B 7. Admission, transport and discharge of patients colonized or infected with MRSA

When patient is known MRSA carrier and admission to hospital is planned only administrative part of admission is performed in the emergency room (ER). All necessary examinations (blood pressure, ECG, blood tests, etc.) are performed on the ward where the patient is hospitalized. When the patient is known MRSA carrier and his/her admission to the hospital is pending all necessary examinations are performed in the emergency room. All recommended precautions for MRSA colonized patient should be implemented (hand disinfection and disinfection of equipment for multiple use). Admission procedures are depicted in Appendix A. Patients colonized or infected with MRSA are moved inside the hospital only when it's really necessary. Transport of colonized patients must be planned in advance and supervised:

- a. wounds colonized with MRSA must be covered appropriately
- b. transport should be planned in such a way that patient doesn't wait for the examination (direct hand-over)
- c. accompanying persons should wear personal protective equipment (gloves, gown when contamination of work clothing is expected)
- d. after patient hand-over gloves and gown should be thrown into waste bin, hands should be disinfected
- e. colonized patient should be planned last for the diagnostic procedures such as endoscopy, ultra sound, X-ray examination, etc. Ward coordinator who contacts the diagnostic unit and delivers an order for diagnostic procedure should call the attention of the staff of the diagnostic unit to MRSA colonization of the patient
- f. equipment which was in contact with the colonized patient during diagnostic procedure should be disinfected upon completion of the procedure

Colonization with MRSA should be noted in patient's discharge papers (code Z22.3). Colonization with MRSA should stay noted in paper and electronic patient records until a successful decolonization procedure is performed and proved with negative results of all samples obtained three times with two days interval between collection (Recommendation for decolonization – Appendix D). Only then the MRSA mark in electronic patient's records can be abolished.

B 8. Prudent use of antibiotics in the hospital

Hospital should have written guidelines for the use of antibiotics prepared by Committee for Utilization of Material Resources of University Clinic of Respiratory and Allergic Diseases Golnik. Guidelines should be based on epidemiology of particular infections and on local susceptibility data for different pathogens prepared by Laboratory for Respiratory Microbiology in the hospital. Education on antibiotics and prudent use of antimicrobials should be performed regularly as well as auditing of their use in the hospital.

B 9. High standard of aseptic techniques and patient care

All procedures should be performed according to written recommendations which determine in what way all diagnostic, therapeutic and nursing procedures with higher risk of infection are to be carried out. Appropriate disinfectants, personal protective equipment, accessories for single use should be ready available.

- a. when in direct contact with the patient, his/her excrements, patient's bed and belongings we should wear powder-free gloves. After removal of the gloves they should be disposed of in the designated yellow waste bag and hands should be disinfected using alcohol hand rub.
- b. When contact of the front side of our body and upper arms with the colonized patient is expected we should wear a protective gown. After use the gown should be hanged with

contaminated side turned inwards. Coat-rack should be placed outside the contaminated area. If the gown is not visibly soiled it could be used repeatedly during 24 hours and then changed for the new one.

- c. When only contact of the front side of our body with the colonized patient is expected we could use a single use apron.
- d. Surgical masks should be worn whenever we perform tracheal aspiration, respiratory physiotherapy, care of with MRSA infected or colonized wound or when patient is coughing.

In case we have to use equipment and accessories for multiple use appropriate controlled decontamination and sterilization procedures should be carried out (refer to Recommendations for sterilization procedures of University Clinic of Respiratory and Allergic Diseases Golnik).

B 10. High standard of cleaning and maintenance of rooms and equipment

- a. Individual instruments and equipment should be dedicated for colonized patient only (blood pressure device, stethoscope, trapeze bar, physiotherapy accessories, etc). These objects are stored inside a 1 meter perimeter around the colonized patient (contaminated area) where a waste container with yellow plastic bag is also located. Gloves should be disposed of and hands disinfected inside the contaminated area.
- b. When aforementioned organization of space and equipment is not possible patients colonized with MRSA should be cared for as the last on the ward and afterwards all equipment and accessories should be appropriately disinfected.
- c. Whenever possible on medical wards coat-rack with protective gowns, cart with protective gloves, masks and aprons should be placed outside the room next to the entrance. Gowns should be hanged with contaminated side turned inwards. In the ICU coat-rack should be standing outside contaminated area and not outside the room.
- d. Carts should not be taken into the room with colonized patient. All necessary accessories should be prepared before entering the room.
- e. Objects taken out of isolation room (blood collecting tubes, blood culture bottles, etc.) should be wiped with alcohol disinfectant (Secucid®).
- f. Tray with cutlery should be placed on the kitchen cart as last. There's no need for disinfection of the tray. Plates, glasses and cutlery should be washed in dishwasher.
- g. All surfaces in patient's vicinity (cabinets, shelves, railings, trapeze bars, etc.) should be cleaned regularly (daily) with cleaning disinfectant (2% Incidur®).
- h. Room of a colonized or infected patient should be cleaned as last.

For detailed cleaning procedures, please refer to Recommendations for cleaning and disinfection of rooms and equipment of University Clinic of Respiratory and Allergic Diseases Golnik.

B 11. Appropriate waste management

Single-use items (infective waste) should be disposed of in dedicated containers with yellow plastic bag. Containers are collected when $\frac{3}{4}$ full. Waste generated through patient's personal business (food, paper napkins, paper handkerchiefs, etc) should be disposed of in a separate plastic bag placed beside the bed. When we collect this regular waste the bag should be put into another plastic bag and disposed of as regular domestic (non-infective) waste. For detailed waste management, please refer to Recommendations for waste management of University Clinic of Respiratory and Allergic Diseases Golnik.

B 12. Appropriate linen and other textiles management

Linen, nightgowns, pyjamas and underwear of patients colonized or infected with MRSA are collected together with that of the rest of the patients. Regular washing procedures and washing powders are appropriate for washing. For detailed instructions about classification, transportation and washing of linen, underwear and nightgowns, please refer to Recommendations for classification, transportation and washing of linen, underwear and nightgowns of University Clinic of Respiratory and Allergic Diseases Golnik.

B 13. Screening swabs in HCW

Screening samples (nasal swab, wound swab or swab of skin alterations) from HCW are to be collected whenever a suspicion of intrahospital transmission of MRSA arises. In case we detect a colonized HCW he/she should be excluded from direct contact with the patients, decolonization should be performed and HCW can resume his normal duties when successful decolonization is proven with control samples obtained on three occasions with two days interval between collections.

B 14. Regular audits of infection control program execution

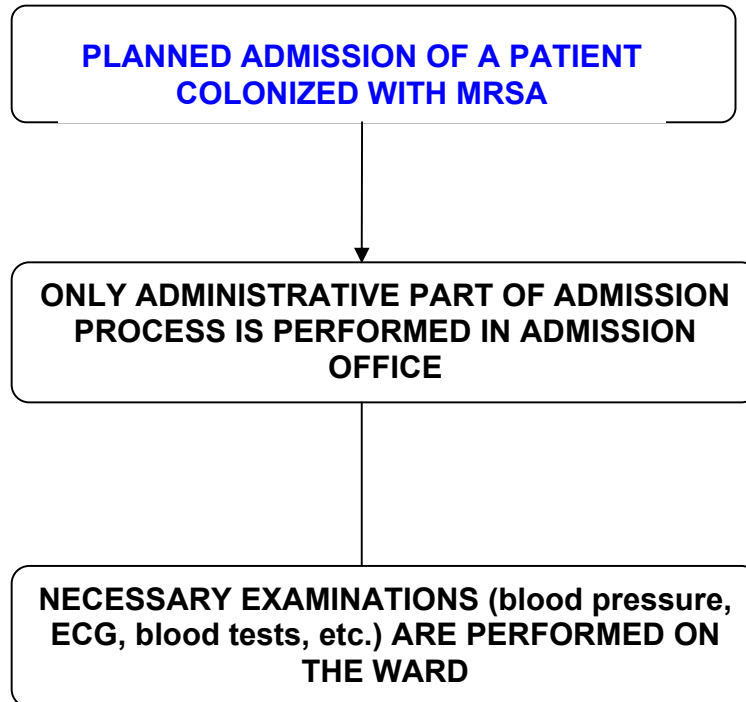
Execution of hospital infection control program recommendations should be regularly audited. When suspicion of intrahospital transmission of MRSA arises ICT should be notified. ICT should establish if all necessary procedures of caring for a colonized patient were executed properly and whenever possible find a cause of intrahospital transmission.

B 15. Education of HCW, patients, their relatives and visitors

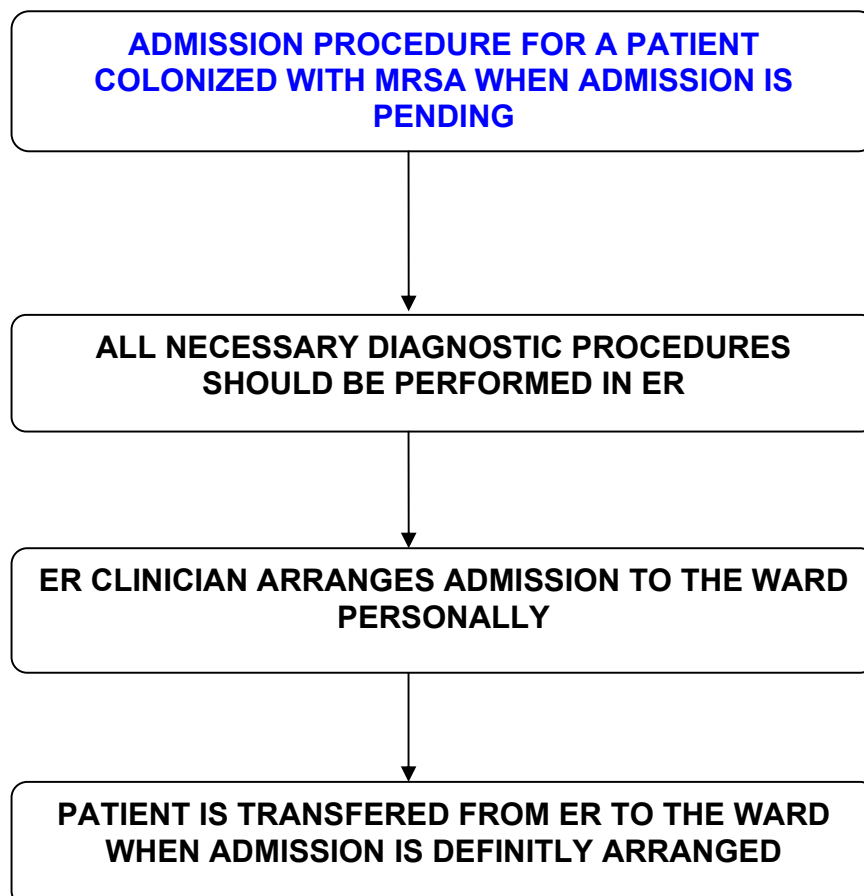
Education of HCW is performed in regular intervals (at least every 6 month). Clinician should inform the patient of his/her colonization with MRSA. Patients, their relatives and visitors are offered all necessary information on MRSA, ways of transmission, risk for relatives and visitors, how to interact with colonized patient, etc. Patients, relatives and visitors are provided with written leaflets about MRSA and recommended hand hygiene procedures.

APPENDIX A

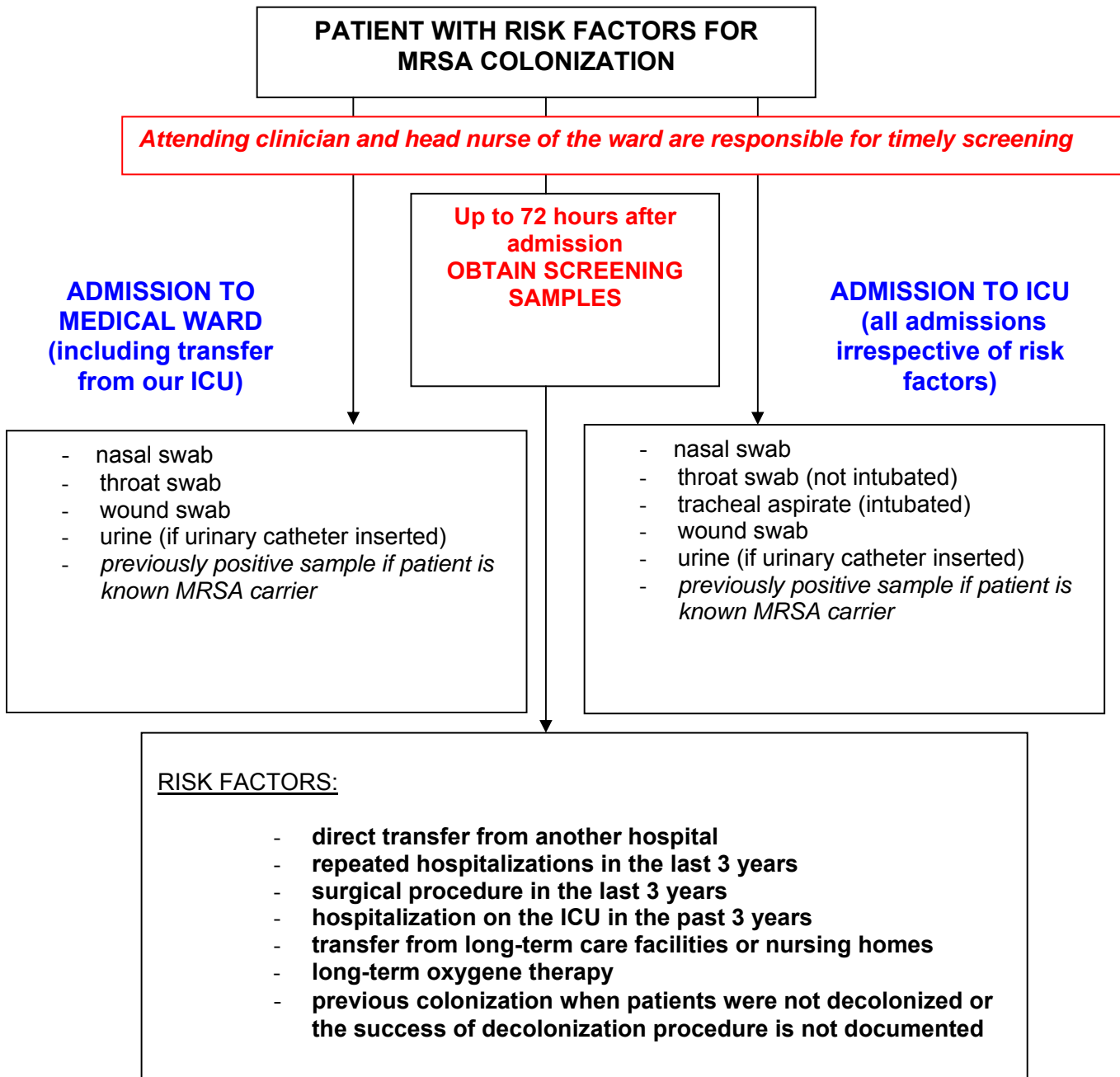
ADMISSION PROCEDURE FOR PATIENTS KNOWN TO BE COLONIZED WITH MRSA – PLANNED ADMISSION



ADMISSION PROCEDURE FOR PATIENTS KNOWN TO BE COLONIZED WITH MRSA – ADMISSION PENDING



APPENDIX B



WHICH SWABS should be used:

- **During working hours of the Laboratory for Respiratory Microbiology** (Monday - Friday 7.00 am – 03.45 pm and Saturday 7.00 am – 10.30 am) – **swabs with blue cap with no transport medium**, swabs should be taken to the laboratory **immediately**
- **Outside working hours of the laboratory** (between 04.00 pm and 07.00 am during the week, from 10.30 am Saturday till 07.00 am Monday during weekends and all day on bank holidays) – **swabs with colourless cap with transport medium**, swabs should be stored at room temperature

APPENDIX C

CONTACT ISOLATION FOR PATIENTS COLONIZED WITH MRSA

1. Placement of the patient:
 - a. Patients known or suspected to be colonized with MRSA should be preferably placed in a single room with en-suite bathroom and toilet
 - b. When single room is not available cohorting of patients colonized with MRSA should be performed
 - c. When options a. and b. are not possible patient colonized with MRSA can be admitted to the same room as uncolonized patient. In this case at least 1 meter of distance between furniture and personal belongings of colonized and uncolonized patient should be assured.
 - d. Room door should be kept closed.
 - e. Sign "Contact isolation" should be posted on the door.
 - f. Adequate number of alcohol hand rub containers should be available in the room (at bedside, by the entrance)
 - g. Inside contaminated area (1 meter perimeter around the bed) a container for infectious waste should be placed as well as separate waste bag for non-infectious waste (eg. paper, paper handkerchiefs, napkins, fruit peel, etc)
 - h. A coat-rack for protective gowns should be placed outside contaminated area (valid for ICU) or outside the entrance to the room (valid for medical ward). Gown should be hanged on the coat-rack with contaminated side turned inwards.
 - i. Cart with protective masks, gloves, gowns and single-use aprons should be placed outside the room and not brought into the contact isolation room.
 - j. Patient (medical) chart should be located outside the contaminated area or brought into the room when needed and should not be hanging on the foot of the bed
 - k. HCW, patient relatives and visitors are not allowed to sit on the bed
 - l. Attending physician should inform the patients about his/her colonization with MRSA and explain the precaution necessary to prevent transmission of MRSA to any other patient
 - m. Before entering the contact isolation room relatives and visitors should talk to HCW. HCW should inform them about necessary precautions and provide them with the educational leaflet on MRSA.

2. Protective equipment:
 - a. Powder-free gloves should be used which enable us to disinfect our hands after taking the gloves off.
 - b. Gloves should be worn when in contact with the patient, his/her excrements, bed, patient belongings and other items in contact with the patient
 - c. After use the gloves are taken off and disposed of in the dedicated containers placed inside the contaminated area. Subsequently hands are disinfected.
 - d. Protective gown is worn for procedures where direct contact of the front of our body and bare arms with the patient or contaminated surfaces is possible or probable.
 - e. Whenever only front part of our body will be in contact with contaminated area aprons for single use can be worn.
 - f. When we take off the gown it should be hanged on the coat-rack placed outside the contaminated area (ICU) or beside the room entrance (medical ward).

Gown is hanged with the clean side (inner surface) turned outwards. The gown can be used repeatedly during 24 hours unless it's visibly soiled.

- g. Face masks should be used during procedures whenever the patient is coughing or sneezing, during tracheal aspiration, respiratory physiotherapy, wound treatment.

3. Equipment and accessories:

- a. Individual equipment and accessories should be used for the colonized patient only (sphygmomanometer, stethoscope, trapeze bars, physiotherapy kit, etc). These items should be located inside the contaminated area (1 meter perimeter around the patient). Designated waste container should be located in this area as well. Before leaving the contaminated area we should take off the gloves, discard them and disinfect our hands.
- b. Coat-rack with protective gowns, shelf or cart with protective masks, gloves and single-use aprons is placed outside the contaminated area in the ICU.
- c. Coat-rack with protective gowns, shelf or cart with protective masks, gloves and single-use aprons is placed outside the room (beside the entrance) on the medical wards.
- d. When equipment and accessories cannot be used exclusively for a colonized patient all therapeutic and nursing procedures should be done as last on the schedule and all items should be cleaned and disinfected after use.
- e. Carts should not be taken into contact isolation room. All items that we intend to use should be prepared before entering the room.
- f. All items that are taken out of patient's room (blood collecting tubes, blood culture bottles, etc.) should be wiped with alcohol disinfectant (Secucid®).
- g. Tray with cutlery should be placed on the kitchen cart as last. There's no need for disinfection of the tray. Plates, glasses and cutlery should be washed in dishwasher with ordinary detergent.
- h. All surfaces in patient's vicinity (cabinets, shelves, railings, trapeze bars, etc.) should be cleaned regularly (daily) with cleaning disinfectant (2% Incidur®).
- i. Linen, night gowns, pyjamas can be machine washed with ordinary detergent.

4. Transport of the patient:

- a. Movement of the patient outside the contact isolation room should be limited to the necessary errands.
- b. Diagnostic and therapeutic procedures should be performed in the patient's room whenever possible.
- c. When patient should be taken to another ward or diagnostic unit the staff should be informed in advance of the MRSA colonization status of the patient.
- d. Colonized patient should be planned for the procedure as last.
- e. Patient should not wait for the procedure and should be handed over to another medical team directly.
- f. Staff which is involved in transport of the patient should wear gloves and single-use apron or protective gown. After handing over the patient gloves, apron or gown are taken off and discarded in designated container.
- g. After the procedure all equipment, accessories and surfaces that were in contact with the patient should be cleaned and disinfected.

APPENDIX D

DECOLONIZATION PROCEDURE

Before decolonization procedure is started perineal swabs should be obtained to determine colonization of GIT

1. Decolonization of the whole body (standard procedure)
 - a. **Once a day** whole body and scalp is washed with **polihexanide solution** (Prontoderm®) or antiseptic soap containing 4,5% chlorhexidine (eg. Plivasept peneči®)
 - b. After whole body wash bed linen, nightgown and underwear as well as towels are changed
 - c. **Twice a day** nasal musosa is treated with **mupirocin ointment** (Bactroban®). Ointment should be rubbed deeply into both nostrils. The whole tube of mupirocin ointment should be used for each 5 days decolonization procedure. When MRSA is highly resistant to mupirocin **Prontoderm® gel light ointment** should be used 5 times a day.
 - d. **Three times a day** after a meal patient should **gargle** polyhexanide solution **ProntOral®** or 0,2% solution of chlorhexidine (eg. solution of Hibisept® in water). Dentures should be removed before gargle, cleaned with 0,2% solution of chlorhexidine and soaked in the same solution overnight.

2. Additional procedures depending on presence of MRSA in different samples:
 - a. MRSA in **tracheal aspirate or sputum**
 - **sulfamethoxazole / trimetoprim** (eg. Primotren®) **160/800 mg b.i.d. orally 5 days**, if MRSA is sensitive to the antibiotic
 - when MRSA is resistant to sulfamethoxazole / trimetoprim consult ICT
 - additional control of decolonization is needed after extubation (item 4)

 - b. MRSA in **urine**
 - **sulfamethoxazole / trimetoprim** (npr. Primotren®) **160/800 mg b.i.d. orally 5 days**, if MRSA is sensitive to the antibiotic
 - when MRSA is resistant to sulfamethoxazole / trimetoprim consult ICT
 - when permanent urinary catheter present and cannot be removed:
 - sulfamethoxazole / trimetoprim (eg. Primotren®) 160/800 mg b.i.d. orally 14 days
 - on day 14 change of permanent catheter and followed by
 - sulfamethoxazole / trimetoprim (eg. Primotren®) 160/800 mg b.i.d. orally 14 days

 - c. MRSA in **faeces/perineal swab** – vancomycin 500 mg t.i.d. orally 5 days

 - d. MRSA at **intravascular catheter insertion site or in blood culture**
 - **catheter** should be **removed immediately** and decolonization started
 - if new intravascular catheter is needed it should be inserted at least 30 minutes after intravenous application of 1.0 g of vancomycin
 - treatment of infection (sepsis) – **vancomycin or teicoplanin**

Decolonization procedure goes on for **5 days**. Success of decolonization is checked by surveillance samples which are collected **three times with 2 days interval between collections**.

3. Decolonization of the nasal mucosa when MRSA is resistant to mupirocin:
 - Low level resistance ($MIC = 4 - 256 \text{ mg/l}$) – mupirocin (Bactroban®) **3 times a day** into both nostrils for **10 days**
 - High level resistance ($MIC \geq 512 \text{ mg/l}$) – Prontoderm® gel **light 5 times a day** into both nostrils + combination of 2 antibiotics orally MRSA is sensitive to (contact ICT, ext. 401) **10 days**
4. Collection of samples to check the success of decolonization:
 - a. Initially only **previously positive samples** are collected
 - b. 48 hours after first collection and before second set of samples is collected **enquire** in the Laboratory for Respiratory Microbiology if **all samples of the first collection are negative** for MRSA
 - c. **If all samples of the initial collection are negative** for MRSA second set of samples is collected which includes:
 - nasal swab,
 - throat swab
 - swab of axillae and inguinal area
 - perineal swab
 - wound swab if present
 - sputum or tracheal aspirate, if previously positive for MRSA
 - urine, if previously positive for MRSA
 - d. **if all samples of the second collection are negative 48 hours after collection** (check with the lab), third set of samples is collected. Third set is identical as the second set of samples.
 - e. **Decolonization is successful when all samples of all three collections are negative for MRSA!**
5. **Decolonization should be reconsidered (very little chance of success)if:**
 - presence of wound, fistula, gastrostomy or tracheostomy
 - presence of urinary catheter (when MRSA detected in urine)
 - presence of tracheal tube
6. Decolonization of HCW:
 - a. Procedure is the same as decolonization of patients
 - b. During decolonization HCW should shouldn't have any contact with patients For complete absence from work an agreement with the his/her superior has to be made.
 - c. Success of decolonization is proven the same way as with patients
 - d. When successfully decolonized previously positive samples of HCW should be checked again after 1, 6, 12 and 18 months.

1. STANDARD DECOLONIZATION PROCEDURE

(MRSA sensitive to mupirocin)

AGENT	USE	PREPARATION	HOW OFTEN	HOW LONG	COMMENT
Prontoderm®	scalp and body wash	Mix with warm water 1:1	1 x /day	5 days	
Prontoral®	gargle	Ready to use	3 x / day after meal	5 days	
Bactroban® (mupirocin)	nasal ointment	Ready to use	2x / day	5 days	
Primotren®	orally	Ready to use	160 / 800 mg b.i.d.	5 days	if MRSA in sputum, tracheal aspirate or urine and is susceptible to cotrimoxazole
Vancomycin	orally	Prepared in pharmacy	500mg t.i.d.	5 days	if MRSA in faeces, perineal swab
0,2% chlorhexidine	cleaning, soaking of dentures	Prepared in pharmacy	3x / day cleaning, soaking overnight	5 days	After cleaning and soaking dentures should be rinsed with water
Prontosan®	rinsing, cleaning of wounds	Ready to use		5 days	if MRSA present in wound

2. STANDARD DECOLONIZATION PROCEDURE

MRSA WITH LOW LEVEL MUPIROCIN RESISTANCE (MIC = 4 – 256 µg/ml)

AGENT	USE	PREPARATION	HOW OFTEN	HOW LONG	COMMENT
Prontoderm®	scalp and body wash	Mix with warm water 1:1	1 x /day	10 days	
Prontoral®	gargle	Ready to use	3 x / day after meal	10 days	
Bactroban® (mupirocin)	nasal ointment	Ready to use	3x / day	10 days	
Primotren®	orally	Ready to use	160 / 800 mg b.i.d.	10 days	if MRSA in sputum, tracheal aspirate or urine and is susceptible to cotrimoxazole
Vancomycin	orally	Prepared in pharmacy	500mg t.i.d.	10 days	if MRSA in faeces, perineal swab
0,2% chlorhexidine	cleaning, soaking of dentures	Prepared in pharmacy	3x / day cleaning, soaking overnight	10 days	After cleaning and soaking dentures should be rinsed with water
Prontosan®	rinsing, cleaning of wounds	Ready to use		10 days	if MRSA present in wound

3. STANDARD DECOLONIZATION PROCEDURE

MRSA HIGH LEVEL MUPIROCIN RESISTANCE (MIC \geq 512 $\mu\text{g/ml}$)

AGENT	USE	PREPARATION	HOW OFTEN	HOW LONG	COMMENT
Prontoderm®	scalp and body wash	Mix with warm water 1:1	1 x /day	10 days	
Prontoral®	gargle	Ready to use	3 x / day after meal	10 days	
Prontoderm gel light®	nasal ointment	Ready to use	5x / day	10 days	
Combination of 2 antibiotics (consult ICT, ext. 401)	orally	Ready to use	Depends on antibiotic	10 days	
Vancomycin	orally	Prepared in pharmacy	500mg t.i.d.	10 days	if MRSA in faeces, perineal swab
0,2% chlorhexidine	cleaning, soaking of dentures	Prepared in pharmacy	3x / day cleaning, soaking overnight	10 days	After cleaning and soaking dentures should be rinsed with water
Prontosan®	rinsing, cleaning of wounds	Ready to use		10 days	if MRSA present in wound

5. ALTERNATIVE DECOLONIZATION PROCEDURE
(MRSA sensitive to mupirocin)

AGENT	USE	PREPARATION	HOW OFTEN	HOW LONG	COMMENT
Plivasept peneči®	scalp and body wash	Ready to use	1x / day	5 days	
0,2% chlorhexidine	gargle	Prepared in pharmacy	3x / day after meal	5 days	
Bactroban® (mupirocin)	nasal ointment	Ready to use	2x / day	5 days	
Primotren®	orally	Ready to use	2 x 2 tbl. dnevno	5 days	if MRSA in sputum, tracheal aspirate or urine and is susceptible to cotrimoxazole
Vancomycin	orally	Prepared in pharmacy	500 mg t.i.d.	5 days	if MRSA in faeces, perineal swab
0,2% chlorhexidine	cleaning, soaking of dentures	Prepared in pharmacy	3x / day cleaning, soaking overnight	5 days	After cleaning and soaking dentures should be rinsed with water

APPENDIX E DECOLONIZATION DIARY

Patient data

MRSA ISOLATED FROM: nose throat sputum/aspirate axillae inguinal area
wound urine perineal area other.....

**DECOLONIZATION
ATTEMPT**

FIRST	SECOND	THIRD
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DATE (5 days or 10 days) (circle)

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-	-	-	-	-	-	-	-	-	-

Date

BODY AND HAIR WASH 1x / day

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Mark with ✓

NASAL OINTMENT 2x or 3x or 5x / day (circle)

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Mark with ✓

GARGLE or MOUTH HYGIENE 3x / day
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Mark with ✓

ANTIBIOTIC

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Mark with ✓

LINEN CHANGE in CHANGE OF NIGHTGOWN and TOWELS 1x / day after bath
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Mark with ✓

Two days after completion of decolonization only control of **specimens from previously positive sites** should be collected.

NOTE: For all decolonization procedures except standard decolonization procedure an ICT permission is needed (ext. 401).