

Supplementary Information

Results S1

Questionnaire

Background – The questionnaire was sent to 161 nursing home staff members, and 74 respondents (a 46% response rate) from four nursing homes completed the questionnaire (51 full and 23 partial completions). Both full and partial completions are included in the following. The number of responses among nursing homes ranged from N= 14-21 and the majority of respondents worked as social and healthcare assistants (34%) or social and healthcare helpers (27%; See Table S2 for a full description of participant background information). Leaders mainly had a background as nurses or social and healthcare assistants.

Knowledge of MRSA – The majority of respondents had heard of (97%) and reported general good knowledge about MRSA (Fig. 1 in main text). However, 3% reported to never having heard of MRSA, and 22% and 2% reported to having less good or poor knowledge on MRSA, respectively (Fig. 1a-b in the main text). Knowledge about MRSA seemed to differ among job groups (Fig. 1c in the main text). The respondents knew about MRSA from several sources, mainly from colleagues and the guidelines on prevention of spread of MRSA. Most agree (40%) or strongly agree (31%) that they have enough information on MRSA to feel safe working with residents with MRSA, whereas 23% have no opinion and 6% disagree. The majority also agrees that they would know who to approach to obtain more knowledge on MRSA.

Experience with MRSA – Three percent (n = 2) reported that they had had MRSA and 5% reported that family members had had MRSA. Sixty-six respondents answered that they, throughout their career, had worked with residents with MRSA, while 22% reported no and 12% reported that they did not know. At the current work place, most answered that they had worked with residents with MRSA (58%), while others responded that they had not (37%) or did not know (5%).

Multiple-choice test on MRSA – Respondents scored approximately 60% of the 11 items correct. The part most got wrong was what MRSA was an abbreviation for (choices being Multi-resistant vs Methicillin-

resistant or Streptococcus vs Staphylococcus). There was also uncertainty about where to sample from when determining MRSA colonisation. Sixty-six per cent correctly answered nose, 59% correctly answered throat, and 47% correctly answered groin. The majority (94%) knew that the main mode of spread is via hands, but only about half knew that MRSA can also spread via air. Similarly, only about 50% knew that an infection with MRSA gives the same symptoms as an infection with MSSA; 37% did not know.

Knowledge of infection hygiene guidelines – Most respondents (83%) rated their knowledge of infection hygiene as good, very good or excellent (Fig. 2a in the main text). Self-reported knowledge differed among job groups ($F_{6,49} = 3.67$, $P = 0.029$; Fig. 2b in the main text). Respondents report that they received their knowledge through education (38%), a colleague (31%), from the national guidelines from the Danish Health Authority (27%), a hygiene nurse (26%), and/or a leader (20%). Regarding the ‘Guideline for prevention of spread of MRSA’ from the Danish Health Authority, 26% reported to have read the official guideline, while 16% had read a local or municipal version, 38% had heard of the guideline but not read it, and 21% had not heard of the guideline.

Compliance with infection hygiene guidelines – The majority of respondents reported that they have easy access to gloves (100%) and protective clothing (such as disposable aprons, gowns, and coveralls; 98%). Protective eyewear (incl. visors) and facemasks (surgical masks and respirators) seem to be less easily available. Around 40% and 10% say they do not have easy access to protective eyewear and face masks, respectively. Overall, the level of easy access to protective eyewear and facemasks differed among nursing homes (protective eyewear: $F_{3,36} = 2.27$, $P = 0.097$; facemasks: $F_{3,36} = 7.94$, $P < 0.001$). Ninety percent reported that they always or mostly always follow the infection hygiene guidelines, but this differed among job groups and nursing homes (a significant interaction effect; $F_{12,36} = 2.14$, $P = 0.039$). Eighty-one percent report that their workplace as a whole always or mostly always followed the guidelines. In the questionnaire, the respondents were asked about potential factors that may contribute to why the infection hygiene guidelines are not always followed (Fig 4a-b). When asked about the potential factors that may contribute to why the infection hygiene guidelines are not always followed, respondents answered, among others, a lack of cleaning personnel, lack of knowledge of infection hygiene, lack of knowledge of MRSA, poor contact with residents with MRSA due to dementia or mental health, and economic challenges regarding increased care for resident with MRSA (Table S3).

Job specific questions regarding infection hygiene

Respondents with care tasks: Before and after many of the same tasks, respondents reported using both hand washing and hand sanitizer (Table S4). All respondents reported that they use gloves when there is a risk of contact with blood, faeces etc., whereas 58% say they always and 24% say they sometimes use protective clothing in the same situations. Respondents reported that they mostly use gloves and protective clothing during most tasks dealing with residents colonised with MRSA, e.g. wound cleaning, change of catheter etc. and when dealing with visually contaminated laundry from the MRSA resident (Tables S5). Gloves and protective clothing are used more rarely and sometimes never for regular contact with the resident colonised with MRSA, both in common areas and in residences (Table S5). Seventy-three percent of respondents stated they always use facemasks when there is a risk of splashes and sprays of blood, saliva etc., whereas 19% stated they never use it. Fifty-one percent also stated that they never use protective eyewear when doing tasks where there is a chance of splashes and sprays of blood, saliva and the likes, whereas 30% said they always use it. The use of protective eyewear seemed to differ among respondents, with a large group saying they never use them for various tasks with the resident colonised with MRSA while others stated that they always use them (Table S5).

Respondents with cleaning tasks: Before and after contact with residents in general, the majority sanitize their hands whereas hand washing is done less frequently (Table S6). Gloves are always worn when there is a risk that blood or faeces will get onto hands. During regular contact with residents colonised with MRSA gloves are worn less than half the time (Table S6). Sixty-two percent of respondents say that cleaning supplies used for cleaning in a MRSA residents' home never gets used in other places at the nursing home, however 15% say that this always happens, and 8% state that it sometimes happens. Contact points such as handles, bed rests, water taps, toilet seats and light switches in rooms of a resident with MRSA are always or mostly always wiped with a disinfectant after normal cleaning. Similarly, contact points in common areas are always or mostly always disinfected several times a day.

Respondents with laundry tasks: Eighty percent of respondents (four of the five responses) state that they always use gloves when handling regular laundry and when in contact with laundry, both visually and non-

visually contaminated. Most (60% of respondents) only wash part of the laundry at the nursing home while most laundry is sent to industrial cleaning. The two remaining responses state that all and none of the laundry is sent for industrial wash, respectively. Regular laundry washed at the nursing home is washed at 60°C or 80°C. Laundry of residents colonised with MRSA are almost never washed at a minimum of 80°C (75% of respondents), but respondents say that the laundry is always washed separately from laundry from the other residents.

Opinions on consequences of working with residents with MRSA – Some of the nursing home staff worried about MRSA. For example, some respondents reported that they are a lot (22%) or very much (8%) worried about contracting MRSA, a lot (35%) or very much (14%) worried about bringing MRSA from work to family and acquaintances, and a lot (27%) and very much (18%) worried about being the cause of transfer of MRSA to other residents in the nursing home. Whether respondents are worried about being the cause of transfer of MRSA to other residents in the nursing home, 18% and 27% respond that they are worried very much or a lot, while 22% and 20% state that they are a little or not at all worried. Whether contracting MRSA would have a negative influence on respondents' social lives, 27% and 25% answered that they agreed or completely agreed, whereas 14% and 10% answered that they disagree or completely disagree, however this depended on both nursing home and job group ($F_{3,29} = 3.05$, $P = 0.044$; $F_{6,42} = 2.50$, $P = 0.045$), where respondents from two of the nursing home mainly reported they neither agreed nor disagreed, but respondents from the two other nursing homes were mainly more worried. Fourteen and two percent state that they agreed or completely agreed that they would be afraid to tell their acquaintances that they work with residents with MRSA because they fear it would have a negative impact on their social life, whereas 29% and 31% report that they disagree or completely disagree with the statement. Those that disagree most are typically leaders or work in the 'other' job functions, while those most afraid to tell about a potential MRSA status are nursing home assistants.

Table S1 Temperature and relative humidity measured inside and outside the nursing homes (A-E). Measurements were taken during 14 days for indoor measurements and from morning until afternoon on each day sampled for outdoor measurements. Shown are means \pm sd.

Nursing home	Indoor		Outdoor	
	Temperature °C	Relative humidity %	Temperature °C	Relative humidity %
A	23.4 \pm 1.4	49.1 \pm 9.8	14.8 \pm 1.2	85.9 \pm 6.1
B	20.8 \pm 0.8	39.1 \pm 5.7	2.0 \pm 1.1	98.0 \pm 2.1
C	21.0 \pm 0.5	44.8 \pm 3.9	0.3 \pm 2.1	78.1 \pm 14.8
D	23.8 \pm 0.8	40.2 \pm 5.6	14.7 \pm 5.1	53.1 \pm 19
E	24.7 \pm 1.2	45.0 \pm 5.7	-	-

Information regarding the outdoor temperature and relative humidity during sampling at nursing home E was not available due to a technical error.

Table S2 Background information about respondents to the questionnaire about methicillin-resistant *S. aureus* (MRSA) and infection hygiene.

	mean \pm sd	n	%
<u>Answers</u>			
Full		51	69
Partial		23	31
<u>Gender</u>			
Male		10	14
Female		64	86
<u>Age in years</u>	47 \pm 12		
<u>Time at current job in years</u>	7 \pm 7		
<u>Numbers of participants</u>			
Nursing home A		21	28
Nursing home B		21	28
Nursing home C		18	24
Nursing home E		14	19
<u>Job title</u>			
Leader		5	7
Nurse		5	7
Social and healthcare assistant		24	34
Social and healthcare helper		19	27
Nursing home assistant		3	4
Health care staff		6	9
Other		8	11

Table S3 The degree to which the respondents think certain factors may contribute to why infection hygiene guidelines are not followed, both in general and specific to residents colonised with methicillin-resistant *S. aureus* (MRSA).

	Responses (%)					
	To a very high degree	To a high degree	Partially	To a low degree	To a very low degree	Not relevant
Lack of knowledge on infection hygiene	5.5	30.9	36.4	12.7	14.6	-
Lack of care personnel	3.6	18.2	38.2	21.8	18.2	-
Lack of cleaning personnel	10.9	9.1	32.7	27.3	20.0	-
Lack of clear guidelines from management	3.6	16.1	32.1	23.2	25.0	-
A high degree of unskilled staff	1.8	20.0	43.6	14.6	20.0	-
Poor communication among personnel	3.6	21.4	35.7	25.0	14.3	-
Lack of knowledge about MRSA	7.4	25.9	27.8	16.7	13.0	9.3
Poor contact to resident with MRSA (e.g. due to dementia or mental health)	7.4	24.1	33.3	11.1	13.0	11.1
The guidelines diminish life quality for the resident with MRSA	1.9	5.6	27.8	22.2	24.1	18.5
Economic challenges in relation to increased care of resident with MRSA	7.4	9.3	14.8	22.2	27.8	18.5

Table S4 The frequency of hand wash and use of hand sanitizer before and after different work tasks for staff members involved in nursing tasks.

	Responses (%)				
	Always	Mostly	Sometimes	Rarely	Never
<u>When do you wash hands?</u>					
Before contact with a resident and their home	59.0	12.8	23.1	5.1	0.0
After contact with a resident and their home	79.5	2.6	18.0	0.0	0.0
Before clean tasks	87.2	7.7	2.6	2.6	0.0
After dirty tasks	89.7	5.1	5.1	0.0	0.0
After use or when changing gloves	56.4	18.0	23.1	2.6	0.0
After use or when changing apron/gown	79.5	5.1	12.8	2.6	0.0
<u>When do you use hand sanitizer?</u>					
Before contact with a resident and their home	55.3	18.4	23.7	2.6	0.0
After contact with a resident and their home	84.2	5.3	5.3	5.3	0.0
Before clean tasks	89.5	5.3	2.6	2.6	0.0
After dirty tasks	86.8	5.3	2.6	5.3	0.0
After use or when changing gloves	73.7	13.2	5.3	7.9	0.0
After use or when changing apron/gown	84.2	7.9	5.3	2.6	0.0

Table S5 The use of gloves, protective clothing, and safety glasses and visors during work tasks involving methicillin-resistant *S. aureus* (MRSA)-colonised residents for staff members involved in nursing tasks.

	Responses (%)					
	Always	Mostly	Sometimes	Rarely	Never	Not relevant
<u>Do you use gloves for:</u>						
All care tasks (change of clothes, bathing)	86.8	2.6	2.6	0.0	0.0	7.9
All treatment tasks (wound cleaning, change of catheter)	92.1	0.0	0.0	0.0	0.0	7.9
Regular contact (handshake) in residence	42.1	10.5	5.3	15.8	18.4	7.9
Regular contact (handshake) in common area	29.0	5.3	13.2	15.8	23.7	13.2
Contact with visually contaminated laundry	92.1	0.0	0.0	0.0	0.0	7.9
Contact with non-visually contaminated laundry	76.3	13.2	2.6	0.0	0.0	7.9
<u>Do you use aprons for:</u>						
All care tasks (change of clothes, bathing)	83.78	2.7	2.7		2.7	8.11
All treatment tasks (wound cleaning, change of catheter)	78.38	5.41		2.7		13.51
Regular contact (handshake) with MRSA resident in common room	16.22	10.81	5.41	10.81	45.95	10.81
Contact with visually contaminated laundry	78.38	2.7	8.11		2.7	8.11
Contact with non-visually contaminated laundry	67.57	8.11	8.11	5.41	2.7	8.11
Bedmaking at MRSA-residence	70.27	8.11	5.41	2.7	2.7	10.81
<u>Do you use safety glasses and visors for:</u>						
Bedmaking at resident with MRSA	30.6	2.8	16.7	11.1	25.0	13.9
Change of dressing at resident with MRSA	33.3	8.3	5.6	8.3	27.8	16.7
Contact with resident with airway infection with MRSA	38.9	11.1	11.1	5.6	22.2	11.1
Regular contact (handshake) in room of resident with MRSA	19.4	2.8	13.9	0.0	50.0	13.9
Regular contact (handshake) with MRSA resident in common room	13.9	0.0	0.0	13.9	55.6	16.7

Table S6 Hand wash and the use of hand sanitizer and gloves for staff members working with cleaning tasks.

	Responses (%)					
	Always	Mostly	Sometimes	Rarely	Never	Not relevant
<u>When do you wash your hands</u>						
Before contact with a resident and their home	46.2	23.1	23.1	7.7	0.0	-
After contact with a resident and their home	76.9	7.7	15.4	0.0	0.0	-
After use/change of gloves	61.5	7.7	30.8	0.0	0.0	-
<u>When do you use hand sanitizer</u>						
Before contact with a resident and their home	69.2	15.4	0.0	15.4	0.0	-
After contact with a resident and their home	92.3	7.7	0.0	0.0	0.0	-
After use/change of gloves	92.3	0.0	7.7	0.0	0.0	-
<u>Do you use gloves for</u>						
Cleaning tasks where there is a risk that your hands will get into contact with blood, faeces etc.	100.0	0.0	0.0	0.0	0.0	-
Regular contact (e.g. handshake) with a resident with MRSA in their home	38.5	15.4	7.7	23.1	7.7	7.7
Regular contact (e.g. handshake) with a resident with MRSA in common areas	30.8	15.4	0.0	15.4	23.1	15.4