

Patients with multidrug-resistant organisms feel inadequately informed about their status:

Adverse effects of contact isolation

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Abstract

Background: Contact isolation of patients with multidrug-resistant organisms (MDROs) is an essential element of infection prevention strategies in hospitals worldwide. However, this practice may be associated with adverse side effects on patients' health and well-being.

Aim: This study is the first to assess mental health and well-being variables among isolated patients compared to non-isolated control patients in a German cohort.

Methods: We conducted a matched case-control study among $N = 267$ patients admitted to a tertiary care teaching hospital in Germany. Their levels of anxiety, depression, loneliness, and dissatisfaction with their hospital experience were assessed using a questionnaire. Additionally, among isolated patients, it was evaluated how well they felt informed about their MDRO status.

Findings: In our cohort, patients under contact isolation were significantly more dissatisfied than non-isolated control patients but did not show higher levels of anxiety, depression, and loneliness. A large proportion of patients felt insufficiently informed about their MDRO status. This lack of information was the strongest predictor of dissatisfaction among isolated patients.

Conclusion: These findings underline the importance of adequate patient communication. It is essential for patients' well-being to receive timely, relevant, and understandable information about the background and consequences of their infection or colonisation with MDROs.

keywords: contact isolation; effect on patients; mental health; well-being; MDRO; matched case-control study

Background

Antimicrobial resistance is a major public health concern and a threat to the well-being of millions of people worldwide [1,2]. Transmissions of and infections with multidrug-resistant organisms (MDROs) are also a challenge for German healthcare facilities [3–5]. MDROs are spreading easily in hospitals, narrowing treatment options and thus, leading to prolonged illnesses and increased mortality [6]. To prevent the transmission of MDROs in hospitals, many patients who are known to be colonised or infected are placed under contact isolation. These patients are usually accommodated in single rooms or cohorts, and additional infection control/prevention measures such as wearing personal-protective-equipment are implemented [3–5].

While contact isolation is generally regarded as an essential element of hospital infection prevention strategies, some have questioned its effectiveness as a standalone measure [e.g., 7]. Moreover, it has been shown that contact isolation is associated with adverse side effects on patients' physical health. It has been reported that isolated patients get fewer visits from healthcare workers and have a higher risk of falls, medical errors, and other "objective" adverse events [8–10]. Scholars have also argued that contact isolation might harm patients' mental health and well-being. According to findings from several reviews/meta-analyses, isolated patients have higher levels of anxiety and depression than non-isolated patients [8,11,12]. However, other studies, including one meta-analysis, did not report statistically significant differences in anxiety and depression [13–17] or had mixed findings [18]. Furthermore, a large meta-analysis found that loneliness is significantly associated with depression [19]. Since isolated patients have fewer in-person human interactions, it is plausible that they might feel lonelier than non-isolated patients [see 20 for a qualitative study], which could also affect their level of depression. However, quantitative data confirming this assumption are still missing. Another well-being factor potentially impacted by contact isolation is patient satisfaction or

dissatisfaction. Most studies, including two systematic reviews, showed that isolated patients are less satisfied than non-isolated control patients [9,21,22]. However, some studies did not find significant differences [17,23,24]. One critical factor contributing to patient satisfaction/dissatisfaction is communication and providing information regarding the reason, procedure, and consequences of the contact isolation measure. Communication deficits and lack of information have been found to negatively affect the care experience of patients under contact isolation [20,24–28].

In our literature search, we could not find a study investigating the effect of contact isolation on patients' mental health and well-being conducted in Germany. Consequently, in the present study, it was assessed whether isolated patients in a German hospital exhibited higher levels of anxiety, depression, loneliness, and dissatisfaction than non-isolated patients. Moreover, it was examined how well patients feel informed about the reason for their contact isolation and what implications their colonisation or infection with an MDRO should have on their behaviour inside and outside of healthcare facilities. With this work, we aim to improve the understanding of the impact of contact isolation on the mental health and well-being of hospitalised patients with MDROs.

Methods

Study Design

We conducted a matched case-control study of patients admitted to a tertiary care teaching hospital in Germany. Patients under contact isolation (cases) were compared to non-isolated patients (controls), matched by hospital ward, sex, condition severity, age, and length of stay. The sample planning was guided by a previous paper with a similar study design [18]. The hospital enforces contact isolation measures for a range of pathogens; however, only isolated patients with

MDROs were included. Data were collected between June 2021 and February 2022. Lists of eligible cases and matched controls at the hospital were generated several times per week. We approached all listed patients and asked if they wanted to participate. Patients who gave informed consent were administered a questionnaire, with or without assistance, as requested. The response rate was 74.2% for isolated patients and 73.2% for control patients. The study design was approved by the Research Ethics Committee at the University Hospital Regensburg (# 21-2428-101).

Material and Measures

The questionnaires for the isolated patients and control patients contained 36 and 31 items, respectively. Both questionnaires, the de-identified data, and the analysis script are available online (<https://osf.io/znqjf/>). We used the well-validated German version of the 14-item Hospital Anxiety and Depression Scale [HADS, 29] to measure anxiety and depression. For both subscales, a score ranging from 0 to 21 was calculated. Research has shown that a score of 8 and above is an indicator for both anxiety disorders and depression [30].

We used a single item to measure loneliness. Patients were asked to rate how lonely they felt from 0 (= *not lonely*) to 20 (= *extremely lonely*). Their response was converted into a percentage score ranging from 0-100 %. Single-item loneliness measurements have been shown to correlate highly with longer, well-validated loneliness scales [31].

The German version of the well-validated 15-item Picker Patient Experience Questionnaire [PPE-15, 32] was used to assess patient dissatisfaction. A dichotomous response was coded for every item with 1 = *problem present* and 0 = *problem absent*. Then, all answers were summed to an overall “problem score” ranging from 0 to 15.

The isolated patients received five additional self-developed questions on how well they feel informed about their MDRO status (e.g., “How well do you feel informed by the staff about why you are being isolated?”). We calculated a mean information score ranging from 1 (= *not at all informed*) to 5 (= *very well informed*). The scale showed good internal consistency ($\alpha = 0.87$). In addition, patients’ age, sex, length of stay, ward, and condition severity were taken from their patient records.

Participants

Overall, $N = 267$ patients agreed to participate and were included in the analysis¹. Table I displays their demographics stratified by the patient group. All patients under contact isolation had a positive MDRO status with either one or more of the following bacteria: multidrug-resistant gram-negative bacteria [according to the German classification MRGN; [3]], Methicillin-resistant *Staphylococcus aureus* (MRSA), and Vancomycin-resistant *enterococci* (VRE). These patients are accommodated in single rooms or cohorts, and healthcare workers (and, to some extent, visitors) wear personal protective equipment while caring for and treating the patients. All study participants had to be at the hospital for at least four days prior to the evaluation. We included patients from various wards except ICUs, palliative, and oncology wards. Patients with severe cognitive impairment or inability to respond to the questionnaire were not approached.

¹ Five patients had to be excluded from the analysis. Two people for double participation, two people for length of stay < 4 days, and one person had more than 30% missing values on the questionnaire.

Table 1: Patient demographics

	Isolated (N=118)	Non-isolated (N=149)	Overall (N=267)
Sex			
Male	69 (58.5%)	83 (55.7%)	152 (56.9%)
Female	49 (41.5%)	66 (44.3%)	115 (43.1%)
Age (years)			
Mean (SD)	63.1 (12.2)	62.6 (10.9)	62.8 (11.4)
Median [Min, Max]	64.5 [21.0, 90.0]	63.0 [25.0, 86.0]	64.0 [21.0, 90.0]
Length of stay (days)			
Mean (SD)	16.0 (18.2)	11.7 (8.72)	13.6 (13.9)
Median [Min, Max]	8.00 [4.00, 123]	9.00 [4.00, 67.0]	9.00 [4.00, 123]
Severity of disease			
Low	0 (0%)	0 (0%)	0 (0%)
Medium	51 (43.2%)	65 (43.6%)	116 (43.4%)
High	67 (56.8%)	84 (56.4%)	151 (56.6%)
Method of survey administration			
w/o assistance	69 (58.5%)	80 (53.7%)	149 (55.8%)
w assistance	49 (41.5%)	69 (46.3%)	118 (44.2%)

*Note: N = 267; w/o assistance = questionnaire answered without assistance;
w assistance = questionnaire answered with assistance*

Data Analysis

All statistical analyses were run in R version 4.2.0. In total, 2.03% and 2.57% of the data from the case and control patients were missing, respectively. Missing data were imputed using the MICE package. To test if there were differences between the two patient groups, we calculated a mixed-effects logistic regression model with the patient group as the binary dependent variable (1 = *patients in contact isolation*, 0 = *non-isolated patients*). The model included fixed effects for the predictors (see Table II) and a random effect for the matching patient ID to account for the association between cases and controls. Moreover, a multiple linear regression model was calculated to explain which predictors (see Table III) affected patients' dissatisfaction with their hospital stay.

Results

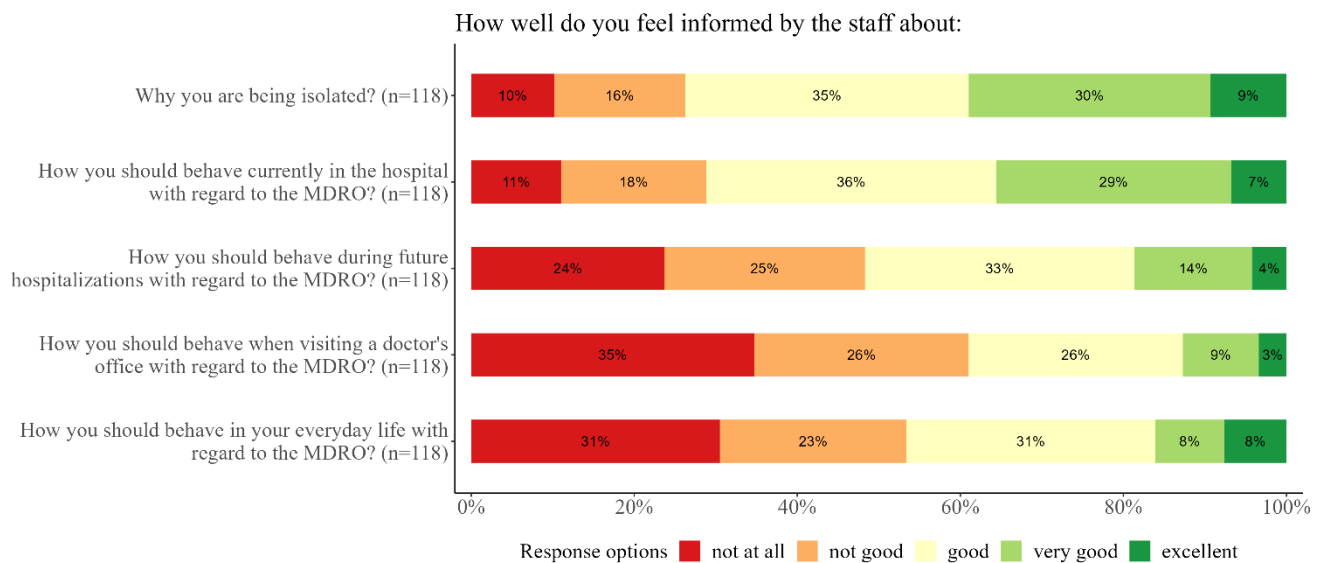
First, we tested whether isolated patients exhibit higher levels of anxiety, depression, loneliness, and dissatisfaction than non-isolated control patients, as shown in some previous research. Only case-control pairs with a good match (i.e., same hospital ward, sex, condition severity, age difference ≤ 7 years, and difference in length of stay ≤ 9 days) were included, resulting in an $N = 164$ for the analysis. Table II shows the results of the logistic regression. Depression levels did not differ between isolated ($M = 6.40$, $SD = 4.46$) and non-isolated patients ($M = 6.43$, $SD = 4.56$). Patients under contact isolation reported slightly higher levels of anxiety ($M = 6.27$, $SD = 4.26$) and loneliness ($M = 32.01$, $SD = 28.15$) compared to the controls (anxiety: $M = 6.12$, $SD = 3.97$; loneliness: $M = 27.38$, $SD = 28.83$) but the differences were not statistically significant. Only patient dissatisfaction varied significantly between the two groups, with isolated patients ($M = 6.20$, $SD = 4.08$) being more dissatisfied than the non-isolated patients ($M = 4.85$, $SD = 3.11$).

Table 2: Logistic mixed multilevel regression model with patient group as criterion

Predictors	OR	SE	95% CI	Statistic	p
(Intercept)	0.67	0.23	0.35 – 1.31	-1.16	0.244
Anxiety	0.99	0.05	0.89 – 1.09	-0.28	0.777
Depression	0.96	0.04	0.88 – 1.05	-0.92	0.359
Loneliness	1.01	0.01	0.99 – 1.02	0.69	0.489
Dissatisfaction	1.12	0.06	1.01 – 1.24	2.09	0.037 *

Note: $N = 164$; $N \text{ Match_ID} = 82$; OR = odds ratio; SE = standard error; $\sigma^2 = 3.29$
 Signif. codes: 0 <= '****' < 0.001 < '***' < 0.01 < '**' < 0.05 < '.' < 0.1 < ' ' < 1

Next, we looked at how well patients felt informed about the reason for their contact isolation and the implications of their MDRO colonisation/infection for their behaviour inside and outside healthcare facilities. Figure 1 shows the response distribution for the five questions included in the questionnaire. Around a quarter of the patients felt insufficiently informed about why they were placed under contact isolation and how they were supposed to behave during their hospital stay. Moreover, approximately half of the respondents reported being insufficiently informed about what implication the MDRO has for their future hospital stays, doctor's appointments, and everyday life.



Finally, since isolated patients were more dissatisfied with their hospital experience than the control patients, we ran a linear regression to test which factors most affected their dissatisfaction (see Table III). Feeling insufficiently informed had the most substantial adverse effect on isolated patients' care experience and vice versa. The only other factor in the model significantly increasing patient dissatisfaction was higher levels of depression. Neither anxiety, loneliness, duration of the hospital stay, sex, age, nor whether the MDRO diagnosis was new or pre-existing was significantly associated with their care experience.

Table 3: Linear regression model with dissatisfaction as criterion

Predictor	Estimates	SE	95% CI	Statistic	p	
(Intercept)	9.03	2.34	4.39 – 13.68	3.86	<0.001	***
Information	-1.30	0.35	-1.99 – -0.62	-3.77	<0.001	***
Anxiety	0.02	0.10	-0.18 – 0.22	0.17	0.863	
Depression	0.23	0.10	0.04 – 0.42	2.42	0.017	*
Loneliness	0.03	0.01	-0.00 – 0.05	1.92	0.057	.
Duration of stay	-0.03	0.03	-0.08 – 0.02	-1.35	0.180	
Sex [female]	0.74	0.64	-0.53 – 2.01	1.15	0.251	
Age	-0.04	0.03	-0.09 – 0.01	-1.47	0.145	
MDRO diagnosis [pre-existing]	0.95	0.80	-0.63 – 2.53	1.19	0.235	

Note: $N = 114$; $SE = \text{standard error}$; $R^2 / R^2 \text{ adjusted} = 0.337 / 0.286$

Signif. codes: 0 <= '****' < 0.001 < '***' < 0.01 < '**' < 0.05 < '.' < 0.1 < '' < 1

Discussion

The present study is the first to compare mental health and well-being variables among patients under contact isolation with matched control patients in Germany. The results showed that isolated patients were significantly more dissatisfied with their hospital experience than non-isolated patients but did not report higher levels of anxiety, depression, and loneliness. We also found that a substantial proportion of patients with MDROs felt insufficiently informed about the reason for their isolation and what they need to be aware of in current and future healthcare settings as well as in everyday life. Further analyses showed that feeling inadequately informed about their MDRO status was the strongest predictor of dissatisfaction among isolated patients. The only other significant predictor of patients' dissatisfaction was higher levels of depression.

Several reviews/meta-analyses have found that isolated patients experience more anxiety and depression than non-isolated patients [8,11,12]. Consequently, we were surprised that this was not the case in the present study. There are various reasons why effects found in the literature are not replicable. One explanation seems most likely in the present case: The survey was conducted during the COVID-19 pandemic. Several meta-analyses found that during the pandemic, people in general [33–35] and hospital patients in particular [33] showed heightened levels of anxiety and depression. Two risk factors for psychological distress during the pandemic are of particular importance to our research: poor health/pre-existing health conditions and social isolation [33,34,36]. For the participants in our study, both risk factors apply to a certain degree. Obviously, all patients, regardless of their isolation status, were hospitalized for a health condition. Moreover, throughout the data collection phase, contact restrictions were imposed by the hospital on all patients (only one visitor per patient per day for a limited amount of time), and face masks had to be worn by everyone. And indeed, in our sample, the mean anxiety ($M = 6.12$) and depression ($M = 6.43$) levels of non-isolated patients were higher than the average mean anxiety ($M_{average} = 5.38$) and depression ($M_{average} = 5.35$) levels of non-isolated patients in the comparable studies using the HADS [15,18,37,38]. Interestingly, previous studies in which the non-isolated patients had above-average anxiety and depression levels also found smaller and non-significant effects [15,18]. The pandemic-related contact restrictions might also help to explain why the isolated patients did not feel lonelier than non-isolated patients since neither group was allowed to receive many visitors. Overall, the hospital experience of isolated and non-isolated patients during the pandemic was more similar than in the pre-pandemic times, in which all the previous studies were conducted. Consequently, this study should be replicated after all COVID-19-related restrictions have been lifted to examine whether they indeed masked

otherwise existing differences in anxiety, depression, and loneliness among isolated and non-isolated patients.

In line with previous research [9,21,22], we found that isolated patients were more dissatisfied than non-isolated control patients. The difference was not strikingly high ($M_{iso} = 6.20$ vs. $M_{con} = 4.85$) but statistically significant. Again, it would be interesting to see if the results would have been more extreme without pandemic-related contact restrictions and precaution measures imposed on all hospital patients. As expected from the literature [20,24–28], patients who were feeling ill-informed about their MDRO status were more dissatisfied with their hospital experience. Looking more closely at what information patients are missing, we saw that 26% felt insufficiently informed (= *not good* or *not at all*) about why they were placed in contact isolation. Moreover, a large proportion of patients reported being inadequately informed about what they needed to be aware of during their current hospital stay (29%), future hospital stays (49%), visits to a doctor's office (61%), and everyday life (54%). The perceived level of information about the MDRO status was by far the most important predictor of dissatisfaction. The only other significant positive predictor of dissatisfaction among our patients under contact isolation was depression (i.e., patients with higher levels of depression were generally more dissatisfied). This association between depression and patient satisfaction/dissatisfaction is well-established in the literature [see 39 for a systematic review].

Limitations

The present study has several limitations: a) the cross-sectional design does not allow a causal interpretation of the results; b) it was conducted at a single centre; c) the sample size for the logistic regression was restricted by the number of suitable matches found between cases and

controls; d) we did not control for pre-existing mental-health disorders; e) the fact that the data were collected during the COVID-19 pandemic might have biased the results.

Conclusion

This is the first German study investigating the adverse effects of contact isolation for patients with MDROs. The results highlight the importance of timely and tailored communication with patients about their condition. Considering that a lack of information was the strongest predictor of dissatisfaction among the isolated patients, better communication strategies need to be implemented. Future research should test whether optimised communication with isolated patients will improve their overall hospital experience and well-being.

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Author Contributions

S.G.: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Project administration, Visualization, Writing – original draft, Review & Editing

S.D.: Investigation (data collection), Writing – original draft

I.B.: Investigation (data collection), Writing - Review & Editing

A.R.: Methodology, Writing - Review & Editing

A.C.P.: Methodology, Writing - Review & Editing

W.S.B.: Resources, Writing - Review & Editing, Supervision

Conflict of Interest Statement

None.

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References

- [1] WHO Regional Office for Europe/European Centre for Disease Prevention and Control. Antimicrobial resistance surveillance in Europe 2022 – 2020 data. Copenhagen: WHO Regional Office for Europe; 2022.
- [2] WHO. Global antimicrobial resistance and use surveillance system (GLASS) report 2021. Geneva: WHO; 2021.
- [3] Kommission für Krankenhaushygiene und Infektionsprävention. Hygienemaßnahmen bei Infektionen oder Besiedlung mit multiresistenten gramnegativen Stäbchen. *Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz* 2012;**55**:1311–54. <https://doi.org/10.1007/s00103-012-1549-5>.
- [4] Kommission für Krankenhaushygiene und Infektionsprävention. Empfehlungen zur Prävention und Kontrolle von Methicillin-resistenten Staphylococcus aureus-Stämmen (MRSA) in medizinischen und pflegerischen Einrichtungen. *Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz* 2014;**57**:695–732. <https://doi.org/10.1007/s00103-014-1980-x>.
- [5] Kommission für Krankenhaushygiene und Infektionsprävention. Hygienemaßnahmen zur Prävention der Infektion durch Enterokokken mit speziellen Antibiotikaresistenzen. *Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz* 2018;**61**:1310–61. <https://doi.org/10.1007/s00103-018-2811-2>.
- [6] Tanwar J, Das S, Fatima Z, Hameed S. Multidrug Resistance: An Emerging Crisis. *Interdiscip Perspect Infect Dis* 2014;**2014**:1–7. <https://doi.org/10.1155/2014/541340>.

- [7] Dettenkofer M, Utzolino S, Luft D, Lemmen S. Patienten mit multiresistenten Erregern: Wirksamkeit und Risiko von Isolierungsmaßnahmen bei „MRSA & Co“. *Zentralbl Chir* 2010;**135**:124–8. <https://doi.org/10.1055/s-0030-1247328>.
- [8] Abad C, Fearday A, Safdar N. Adverse effects of isolation in hospitalised patients: A systematic review. *J Hosp Infect* 2010;**76**:97–102. <https://doi.org/10.1016/j.jhin.2010.04.027>.
- [9] Morgan DJ, Diekema DJ, Sepkowitz K, Perencevich EN. Adverse outcomes associated with contact precautions: A review of the literature. *Am J Infect Control* 2009;**37**:85–93. <https://doi.org/10.1016/j.ajic.2008.04.257>.
- [10] Stelfox HT. Safety of patients isolated for infection control. *JAMA* 2003;**290**:1899. <https://doi.org/10.1001/jama.290.14.1899>.
- [11] Pursell E, Gould D, Chudleigh J. Impact of isolation on hospitalised patients who are infectious: systematic review with meta-analysis. *BMJ Open* 2020;**10**:e030371. <https://doi.org/10.1136/bmjopen-2019-030371>.
- [12] Henssler J, Stock F, van Bohemen J, Walter H, Heinz A, Brandt L. Mental health effects of infection containment strategies: Quarantine and isolation: a systematic review and meta-analysis. *Eur Arch Psychiatry Clin Neurosci* 2021;**271**:223–34. <https://doi.org/10.1007/s00406-020-01196-x>.
- [13] Sharma A, Pillai DR, Lu M, Doolan C, Leal J, Kim J, et al. Impact of isolation precautions on quality of life: a meta-analysis. *J Hosp Infect* 2020;**105**:35–42. <https://doi.org/10.1016/j.jhin.2020.02.004>.

- [14] Day HR, Morgan DJ, Himelhoch S, Young A, Perencevich EN. Association between depression and contact precautions in veterans at hospital admission. *Am J Infect Control* 2011;**39**:163–5. <https://doi.org/10.1016/j.ajic.2010.06.024>.
- [15] Day HR, Perencevich EN, Harris AD, Gruber-Baldini AL, Himelhoch SS, Brown CH, et al. Depression, anxiety, and moods of hospitalized patients under contact precautions. *Infect Control Hosp Epidemiol* 2013;**34**:251–8. <https://doi.org/10.1086/669526>.
- [16] Findik UY, Ozbaş A, Cavdar I, Erkan T, Topcu SY. Effects of the contact isolation application on anxiety and depression levels of the patients: Effects of the contact isolation application. *Int J Nurs Pract* 2012;**18**:340–6. <https://doi.org/10.1111/j.1440-172X.2012.02049.x>.
- [17] Lau D, Majumdar SR, McAlister FA. Patient isolation precautions and 30-day risk of readmission or death after hospital discharge: A prospective cohort study. *International Int J Infect Dis* 2016;**43**:74–6. <https://doi.org/10.1016/j.ijid.2015.12.018>.
- [18] Lupión-Mendoza C, Antúnez-Domínguez MJ, González-Fernández C, Romero-Brioso C, Rodríguez-Bano J. Effects of isolation on patients and staff. *Am J Infect Control* 2015;**43**:397–9. <https://doi.org/10.1016/j.ajic.2015.01.009>.
- [19] Erzen E, Çikrikci Ö. The effect of loneliness on depression: A meta-analysis. *Int J Soc Psychiatry* 2018;**64**:427–35. <https://doi.org/10.1177/0020764018776349>.
- [20] Newton JT, Constable D, Senior V. Patients' perceptions of methicillin-resistant *Staphylococcus aureus* and source isolation: a qualitative analysis of source-isolated patients. *J Hosp Infect* 2001;**48**:275–80. <https://doi.org/10.1053/jhin.2001.1019>.

- [21] Nair R, Perencevich EN, Goto M, Livorsi DJ, Balkenende E, Kiscaden E, et al. Patient care experience with utilization of isolation precautions: Systematic literature review and meta-analysis. *Clin Microbiol Infect* 2020;**26**:684–95.
<https://doi.org/10.1016/j.cmi.2020.01.022>.
- [22] Guilley-Lerondeau B, Bourigault C, Guille des Buttes A-C, Birgand G, Lepelletier D. Adverse effects of isolation: a prospective matched cohort study including 90 direct interviews of hospitalized patients in a French University Hospital. *Eur J Clin Microbiol Infect Dis* 2017;**36**:75–80. <https://doi.org/10.1007/s10096-016-2772-z>.
- [23] Livorsi DJ, Kundu MG, Batteiger B, Kressel AB. Effect of contact precautions for MRSA on patient satisfaction scores. *J Hosp Infect* 2015;**90**:263–6.
<https://doi.org/10.1016/j.jhin.2015.02.007>.
- [24] Gasink LB, Singer K, Fishman NO, Holmes WC, Weiner MG, Bilker WB, et al. Contact isolation for infection control in hospitalized patients: Is patient satisfaction affected? *Infect Control Hosp Epidemiol* 2008;**29**:275–8. <https://doi.org/10.1086/527508>.
- [25] Linda Barratt R, Shaban R, Moyle W. Patient experience of source isolation: Lessons for clinical practice. *Contemp Nurse* 2011;**39**:180–93.
<https://doi.org/10.5172/conu.2011.39.2.180>.
- [26] Criddle P, Potter J. Exploring patients' views on colonisation with meticillin-resistant *Staphylococcus aureus*. *Brit J Infect Control* 2006;**7**:24–8.
<https://doi.org/10.1177/14690446060070020701>.

- [27] Ward D. Infection control: Reducing the psychological effects of isolation. *Brit J Nurs* 2000;**9**:162–70. <https://doi.org/10.12968/bjon.2000.9.3.162>.
- [28] Rees J, Davies HR, Birchall C, Price J. Psychological effects of source isolation nursing (2): patient satisfaction. *Nursing Standard* 2000;**14**:32–6. <https://doi.org/10.7748/ns2000.04.14.29.32.c2805>.
- [29] Petermann F. Hospital Anxiety and Depression Scale, Deutsche Version (HADS-D). *Zeitschrift für Psychiatrie, Psychologie und Psychotherapie* 2011;**59**:251–3. <https://doi.org/10.1024/1661-4747/a000077>.
- [30] Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale. *J Psychosom Res* 2002;**52**:69–77. [https://doi.org/10.1016/S0022-3999\(01\)00296-3](https://doi.org/10.1016/S0022-3999(01)00296-3).
- [31] Pinquart M, Sorensen S. Influences on loneliness in older adults: A meta-analysis. *Basic Appl Soc Psych* 2001;**23**:245–66. https://doi.org/10.1207/S15324834BASP2304_2.
- [32] Jenkinson C. The picker patient experience questionnaire: Development and validation using data from in-patient surveys in five countries. *Int J Qual Health Care* 2002;**14**:353–8. <https://doi.org/10.1093/intqhc/14.5.353>.
- [33] Luo M, Guo L, Yu M, Jiang W, Wang H. The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public A systematic review and meta-analysis. *Psychiatry Res* 2020;**291**:113190. <https://doi.org/10.1016/j.psychres.2020.113190>.

- [34] Leung CMC, Ho MK, Bharwani AA, Cogo-Moreira H, Wang Y, Chow MSC, et al. Mental disorders following COVID-19 and other epidemics: A systematic review and meta-analysis. *Transl Psychiatry* 2022;**12**:205. <https://doi.org/10.1038/s41398-022-01946-6>.
- [35] Arora T, Grey I, Östlundh L, Lam KBH, Omar OM, Arnone D. The prevalence of psychological consequences of COVID-19: A systematic review and meta-analysis of observational studies. *J Health Psychol* 2022;**27**:805–24. <https://doi.org/10.1177/1359105320966639>.
- [36] Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain Behav Immun* 2020;**89**:531–42. <https://doi.org/10.1016/j.bbi.2020.05.048>.
- [37] Wassenberg MWM, Severs D, Bonten MJM. Psychological impact of short-term isolation measures in hospitalised patients. *J Hosp Infect* 2010;**75**:124–7. <https://doi.org/10.1016/j.jhin.2010.01.023>.
- [38] Soon MML, Madigan E, Jones KR, Salata RA. An exploration of the psychologic impact of contact isolation on patients in Singapore. *Am J Infect Control* 2013;**41**:e111–3. <https://doi.org/10.1016/j.ajic.2013.01.037>.
- [39] Batbaatar E, Dorjdagva J, Luvsannyam A, Savino MM, Amenta P. Determinants of patient satisfaction: A systematic review. *Perspect Public Health* 2017;**137**:89–101. <https://doi.org/10.1177/1757913916634136>.