Journal of Hospital Infection 154 (2024) 53—59

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevier.com/locate/jhin

Counselling sessions for patients in contact isolation due to multi-drug-resistant organisms improve informedness and reduce dissatisfaction

V. Gillitzer [a], A. Rath [a], A. Caplunik-Pratsch [a], S. Däumling [a], W. Schneider-Brachert [a], S. Gaube [a,b,*]

[a] Department of Infection Prevention and Infectious Diseases, University Hospital Regensburg, Regensburg, Germany
[b] UCL Global Business School for Health, University College London, London, UK

ARTICLE INFO

Article history:
Received 2 July 2024
Accepted 25 September 2024
Available online 10 October 2024

Keywords:
Patient education
Patient counselling
Patient satisfaction
MDRO
Contact isolation
Hospital experience

SUMMARY

Background: The spread of multi-drug-resistant organisms (MDROs) is a critical health issue. Isolation measures imposed to prevent transmission may result in adverse psychological effects among affected patients. This emphasizes the need for better communication and information to improve their hospital experience and mental well-being as well as to prevent inadequate treatment.

Aim: The present study examined whether tailored counselling sessions during contact isolation could enhance patients' understanding of their situation concerning the significance of their MDRO status and enhance their well-being.

Methods: A pre-post-intervention study was conducted in a German tertiary-care hospital in which $N = 64$ patients who were isolated due to MDROs received tailored counselling. The counselling included information about MDROs, the reason for hospital isolation measures, and appropriate behaviour during and after hospitalization. Participants completed questionnaires before and after the counselling sessions to assess its impact on their informedness, patient (dis)satisfaction and well-being measures.

Findings: Prior to the counselling session, patient dissatisfaction was associated with anxiety and inadequate informedness about MDROs. After the counselling, patients reported a significantly improved comprehension of their MDROs-related situation and a notable decrease in dissatisfaction with their hospital situation, primarily attributed to the acquired information.

Conclusions: This is the first German study to show how improved information about MDROs impacts patient satisfaction in hospitals. The findings stress the crucial need for improving healthcare workers' interaction and communication with patients affected by MDROs.

* Corresponding author. Address: UCL East — Marshgate, 7 Sidings St, London E20 2AE, UK.
E-mail address: susanne.gaube@ucl.ac.uk (S. Gaube).

https://doi.org/10.1016/j.jhin.2024.09.022

Introduction

The spread of multi-drug-resistant organisms (MDROs) increases the risk of severe and potentially life-threatening infections with limited therapeutic options for adequate treatment and is a global health problem [1,2]. Great efforts have been made to find new antibiotics and develop new therapies against MDROs [3]. However, there are relatively few studies that directly address the experience of people colonized and/or infected with these pathogens. Individuals screened positively for MDROs in healthcare facilities are often placed under contact isolation. Contact isolation measures usually include being accommodated in a single room or cohorts and being treated by staff wearing personal protective equipment [4–6]. These measures can have negative effects on patients' health and well-being, including but not limited to higher scores for depression and anxiety [7–10]. Nevertheless, contact isolation will undoubtedly remain an essential component of infection prevention and control strategies to reduce nosocomial transmission of MDROs. Therefore, it is necessary to identify solutions to improve the patients' experience in contact isolation. Several studies have shown that patients feel ill-informed about their MDRO status and the associated infection prevention and control measures [8,11–16]. One of these studies also reported that feeling inadequately informed was the strongest predictor of dissatisfaction among isolated patients [17]. Consequently, scholars have argued that better communication and information could be crucial in reducing the adverse psychological effects of contact isolation [8,12,15,17]. Therefore, the present study aimed to investigate whether improved communication with isolated patients through tailored, face-to-face counselling sessions can positively affect patients' (i) knowledge regarding their MDRO status and management, (ii) satisfaction with their hospital experience, and (iii) well-being during their hospitalization.

Methods

Study design

We conducted a pre-registered, pre-post-intervention study among hospitalized patients under contact isolation due to their positive MDRO status in a tertiary-care teaching hospital in Germany. Data were collected from June to December 2022. Lists of eligible patients at the study site were generated several times weekly. We approached all listed patients, who, according to patient records, should have been cognitively and medically able to participate. The patients were asked whether they were interested in a counselling session concerning their MDRO status and whether they would complete a questionnaire before and after the session, with assistance if required. Individuals who gave informed consent went through the first part of the questionnaire (= T1), followed by receiving tailored information regarding their MDRO situation (= intervention). The second part of the questionnaire (= T2) was completed at least two days (minimum: two days; maximum: 19 days) after the intervention. The study design was approved by the Research Ethics Committee at the University Hospital Regensburg (# 21-2428-101).

Inclusion and exclusion criteria

To be included in the study, patients had to be under contact isolation due to a positive MDRO status with one or more of the following bacteria: meticillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), and multi-drug-resistant Gram-negative (MRGN) bacteria. The latter includes bacteria classified according to German criteria into 3MRGN and 4MRGN, which generally refers to MRGN rods with resistance to three or four of the following antibiotic groups: acyl ureidopenicillins, $3^{rd}/4^{th}$ generation cephalosporins, carbapenems, and fluoroquinolones [5]. We chose to focus on MRGN, MRSA, and VRE because they are a focus of infection control efforts in German hospitals due to their prevalence and challenges in treating infections [18]. Affected patients from all wards except intensive care units, palliative, and radiotherapeutic wards could participate if they were at least 14 years old (from 14 to 17 years, with parental consent). Patients with a documented severe cognitive impairment, severe functional impairment (Barthel score $\leq$50), or acute infection with a non-MDRO (e.g., SARS-CoV-2) were excluded from the study. Patients who could not understand the questionnaire or the content of the counselling, either because of undocumented cognitive impairment, reduced general condition, or insufficient German language skills, were also excluded.

Intervention

The intervention consisted of a tailored counselling session in which patients were offered information about MDROs, the rationale behind contact isolation measures at the hospital, and how they should behave during their current hospital stay, in future healthcare settings, and in everyday life. The conversation was aided by a checklist developed with experienced infection prevention and control team members to provide consistent and comprehensive information to our patients (see Supplementary data). At the beginning of the consultation, patients were asked whether they were aware of the detection of an MDRO and, if affirmed, whether they knew the location of the positively tested site. The counselling sessions lasted between 10 and 30 min.

Measures

Anxiety and depression (at T1 and T2)

Anxiety and depression were measured with the well-validated 14-item German version of the Hospital Anxiety and Depression Scale (HADS) [19]. For both subscales, we computed a score ranging from 0 to 21, whereby a score of 8 or more can be an indication of anxiety disorders or depression [20]. The depression scale showed good internal consistency at T1 (Cronbach's $\alpha = 0.81$) and T2 ($\alpha = 0.83$). For anxiety, internal consistency was also good at T1 ($\alpha = 0.78$) and T2 ($\alpha = 0.80$).

Loneliness (at T1 and T2)

To measure loneliness, we used a single item adopted from Gaube *et al.* [17]. Patients could indicate how lonely they

Table I
Patient demographics and characteristics

	(*N* = 64)
Sex	
Female	28 (43.8%)
Male	36 (56.3%)
Age (years)	
Mean (SD)	60.3 (12.2)
Median (min, max)	62.0 (30.0, 87.0)
Type of MDRO	
3MRGN	7 (10.9%)
4MRGN	1 (1.6%)
MRSA	10 (15.6%)
VRE	40 (62.5%)
Multiple MDROs	6 (9.4%)
Length of stay at T1 (days)	
Mean (SD)	12.6 (15.3)
Median (min, max)	8.0 (1.0, 82.0)
Charlson Comorbidity Index	
Mean (SD)	5.1 (2.5)
Median (min, max)	5 (0, 11)
Method of survey administration	
Without assistance	39 (60.9%) at T1, 21 (32.8%) at T2
With assistance	25 (39.1%) at T1, 43 (67.2%) at T2[a]

MDRO, multi-drug-resistant organism; MRGN, multidrug-resistant Gram-negative; MRSA, meticillin-resistant *Staphylococcus aureus*; SD, standard deviation; VRE, vancomycin-resistant enterococci.
[a] Thereof 14 by phone after discharge.

currently felt, ranging from 0 (= not at all) to 20 (= extremely lonely), which was converted into a percentage score from 0 to 100%.

Patient dissatisfaction (at T1 and T2)

Patient dissatisfaction was rated on the German version of the well-validated 15-item Picker Patient Experience Questionnaire (PPE-15) [21]. For every item, a dichotomous response with 1 (= problem present) and 0 (= problem absent) was coded. From the sum of all answers, an overall 'problem score' ranging from 0 to 15 was calculated. The scale showed good internal consistency at T1 ($\alpha = 0.82$) and T2 ($\alpha = 0.75$).

Informedness (at T1 and T2)

The questionnaires contained five questions adopted from Gaube *et al.* [17] on how well the patients felt informed about their MDRO status, rated on a five-point Likert scale. We calculated a mean information score ranging from 1 (= not at all informed) to 5 (= excellently informed). The scale showed excellent internal consistency at both time points ($\alpha = 0.87$ at T1 and $\alpha = 0.90$ at T2).

Evaluation of the intervention (only at T2)

The intervention was evaluated using two self-developed questions ('*How satisfied were you with the personal MDRO consultation*?' and '*How helpful was the personal MDRO consultation for you?*') on a five-point Likert scale. We calculated a mean evaluation score ranging from 1 (= extremely satisfied) to 5 (= not satisfied at all). The scale showed acceptable internal consistency ($\alpha = 0.63$).

Additional information

Moreover, we recorded how long patients had known about their MDRO status, whether they researched their MDRO and, if affirmed, how they assessed that information, as well as their occupational status and highest level of education. From the patient record, we retrieved age, sex, ward, length of stay, date of MDRO detection, comorbidities, and Barthel score. The Barthel index is a standard measure of a patient's ability to perform activities of daily living [22]. To quantify physical condition, we calculated the Charlson Comorbidity Index [23] for every approached patient.

Data and material availability

To maximize the reproducibility of our research, we uploaded the following documents to an online repository (https://osf.io/ba78v/?view_only=90fca92f1a224ca08d23d55f6d4df0a0): pre-registration, anonymized data file, analysis script, translated questionnaire, and translated checklist.

Results

All statistical analyses were conducted in R version 4.3.2. A total of 3.1% of the data were missing and imputed using the *MICE* package [24]. Initially, 69 patients agreed to participate in the study, but five patients had to be excluded from the analysis due to a missing second questionnaire. Two of them could not remember the first survey, two declined to complete a second survey, and one patient could not be contacted after discharge. This left us with a final sample of $N = 64$. Table I provides an overview of their demographics and patient characteristics.

First, we examined whether patient dissatisfaction was positively correlated with higher levels of depression and lower levels of informedness about MDRO prior to receiving the intervention (at T1), as demonstrated in a prior study [17]. Therefore, we conducted a linear regression with patient dissatisfaction as the dependent variable and depression and informedness as predictors while controlling for anxiety and loneliness. As shown in Table II, feeling better informed about the MDRO status was significantly and inversely linked to patient dissatisfaction. We did not find a statistically significant association between patients' self-reported levels of depression or loneliness and their dissatisfaction. However, self-reported anxiety emerged as a significant positive predictor of patient dissatisfaction.

Next, we investigated whether the counselling had a positive impact on patients' informedness regarding their MDRO status and reduced their dissatisfaction with the hospital experience. To accomplish this, patients' levels of informedness about MDRO status and dissatisfaction before and after the intervention (T1 vs T2) were compared using paired *t*-tests. As illustrated in Figure 1, patients reported feeling significantly better informed after the intervention ($t = -7.67$, df = 63, $P<0.001$, 95% confidence interval (CI) (-1.38 to -0.81)) and less dissatisfied with their hospital experience ($t = 3.56$, df = 63, $P=0.001$, 95% CI (0.53–1.90)).

Table II
Linear regression model with patient dissatisfaction (at T1) as the criterion

Predictor	Estimates	SE	95% CI	Statistic	*P*	
Intercept	5.62	0.39	4.85 to 6.40	14.51	**<0.001**	***
Informedness	-0.97	0.38	-1.73 to -0.22	-2.59	**0.012**	*
Depression	-0.09	0.12	-0.33 to 0.15	-0.75	0.458	
Anxiety	0.54	0.15	0.24 to 0.84	3.61	**0.001**	***
Loneliness	-0.00	0.02	-0.03 to 0.03	-0.32	0.749	

$N = 64$. CI, confidence interval; SE, standard error. R2/R2 adjusted = 0.341/0.297. *** $P \leq 0.001$, ** $P \leq 0.01$, * $P \leq 0.05$.

Moreover, to test whether the improvement in informedness about their MDRO status indeed caused the reduction in patients' dissatisfaction, we conducted a mediation analysis using the *mediation* package [25]. In this analysis, we considered the time point of the intervention (T1 vs T2) as the independent variable, dissatisfaction as the dependent variable, and informedness as the mediator. The results indicate that improvements in informedness about the MDRO status fully mediate the impact of the counselling sessions on patient dissatisfaction (see Figure 2). Approximately 73% of the total effect of the intervention on patient dissatisfaction was mediated through the change in informedness.

Finally, we explored whether patients' perceptions of the intervention influenced its effectiveness. Specifically, we examined whether patients who assessed the intervention more positively (in contrast with those who evaluated it less positively) experienced an improvement in their informedness after the intervention. A linear regression to predict the difference between informedness before and after the intervention (informedness T2 − informedness T1) based on the patient's evaluation of the counselling session was calculated. As demonstrated in Table III, the association between the evaluation of the intervention and the change in informedness before and after the intervention was not found to be statistically significant. Therefore, no further analysis was conducted.

Discussion

This is the first study in Germany to assess the impact of improved communication with isolated patients on their understanding of their situation, satisfaction, and well-being. First, we found a significant association between patient dissatisfaction before the counselling and a perceived lack of information about their MDRO. Contrary to our expectation, we did not find that patients' levels of depression were significantly linked to dissatisfaction; instead, their levels of anxiety played substantial roles. Crucially, after the counselling intervention, patients reported substantially higher levels

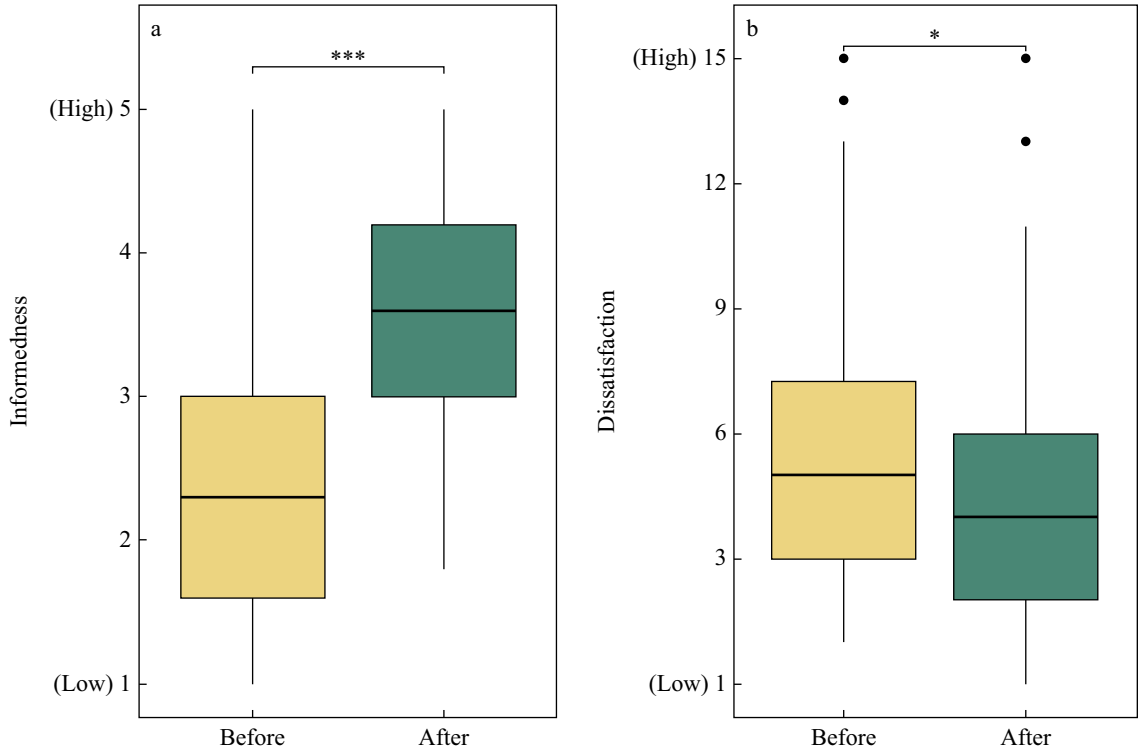

Figure 1. Results of the *t*-tests showing the mean differences in (a) informedness regarding their multi-drug-resistant organisms status and (b) dissatisfaction with the hospital experience before and after the intervention. *** $P \leq 0.001$, ** $P \leq 0.01$, * $P \leq 0.05$.

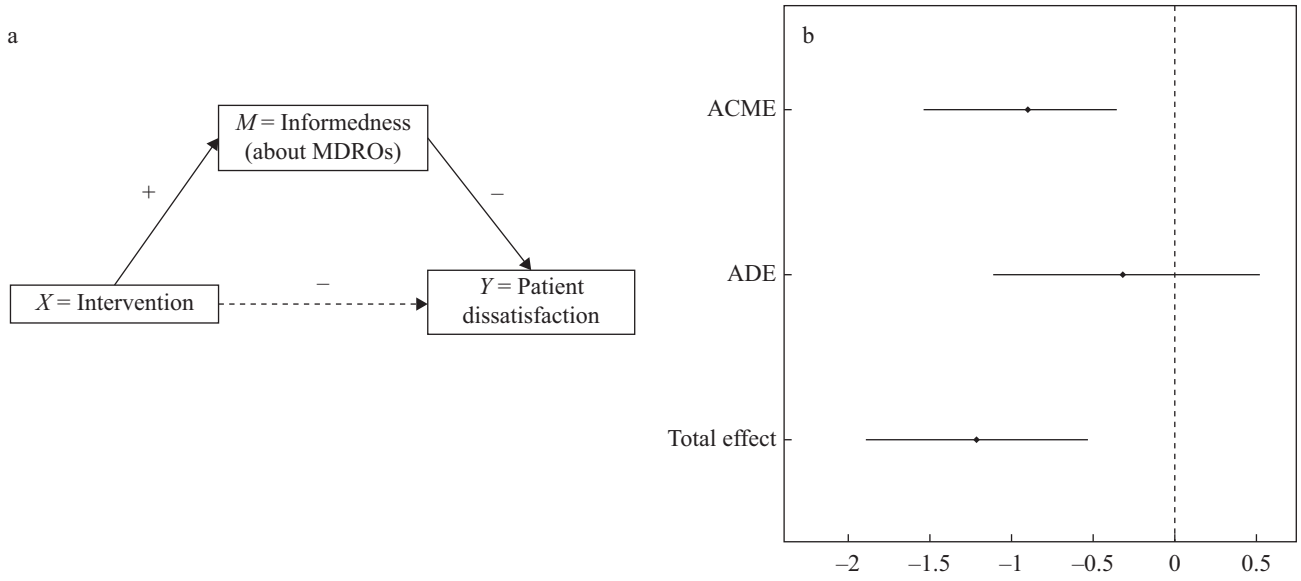

Figure 2. (a) Proposed mediation model and (b) results of the mediation analysis. The Average Causal Mediation Effect (ACME) was estimated at -0.90 (95% confidence interval (CI) (-1.53 to -0.35), $P<0.001$). The Average Direct Effect (ADE) was not statistically significant (estimate = -0.32, 95% CI (-1.11 to 0.51), $P=0.460$). The Total Effect, representing the overall effect of the independent variable on the dependent variable, was estimated at = -1.21 (95% CI (-1.888 to -0.53), $P<0.001$).

Table III
Linear regression model with informedness about multi-drug-resistant organism status as the criterion

Predictor	Estimates	SE	95% CI	Statistic	*P*	
Intercept	1.09	0.14	0.81 to 1.38	7.76	<0.001	***
Evaluation	-0.41	0.26	-0.93 to 0.12	-1.55	0.127	

$N = 64$. CI, confidence interval; SE, standard error. R2/R2 adjusted = 0.037/0.022. *** $P\leq0.001$, ** $P\leq 0.01$, * $P\leq 0.05$.

of informedness regarding their MDRO status and management, coupled with significantly lower dissatisfaction with their hospital stay. We could demonstrate that the predominant factor contributing to the positive impact of counselling on reducing patient dissatisfaction was the improvement in feeling informed. Finally, we did not find a significant association between the evaluation of the counselling session and the change in perceived informedness.

Our finding that patient dissatisfaction is linked to their perception of being inadequately informed about their MDRO status closely aligns with a substantial amount of research [12–14,16,17,26–28]. This growing body of evidence highlights that having a limited understanding of what the positive MDRO status means for patients currently and in the future has a negative effect on the overall hospital experience and satisfaction. This poses a concern because patient satisfaction has been identified as a significant predictor for compliance with medical advice in different contexts [26,29–32]. Research has shown that informed and satisfied patients are more likely to adhere to their medication regimen [33], to participate in preventive screenings [34] and to attend follow-up appointments [32]. In the context of patients with MDROs, it is therefore conceivable that higher satisfaction could also lead to better compliance with hygiene measures. According to our results, reducing patient dissatisfaction depends primarily on improving patients' perception of being well-informed. The burden experienced by patients with MDROs is not solely due to their health condition but is often directly linked to the isolation they experience, as it can exacerbate feelings of uncertainty and a loss of control, contributing to psychological strain [8,35]. In this regard, patient counselling might play a crucial role in empowering patients by providing them with a sense of control and participation in their care. This, in turn, can reduce the psychological burden of isolation and significantly increase overall satisfaction. Another potential factor contributing to the effectiveness of our counselling sessions may be their in-person format rather than simply providing written information. This allowed patients to not only absorb information but also to share their personal experiences and ask questions directly [36]. Finally, improved communication might create a collaborative, trustworthy bond between patients and healthcare providers [31].

The association between heightened anxiety levels and patient dissatisfaction, while consistent with previous investigations [37], contrasts with findings from a similar study with a comparable population and setting that did not establish this relationship as significant [17]. Notably, in the earlier study, depression was linked to dissatisfaction, a connection not replicated in our current study. The exact reasons for the different results remain unclear, but one plausible explanation could be the variation in anxiety levels between the two studies. The mean anxiety was much lower in the current study ($M_{T1} = 5.02$) compared with the previous ($M = 6.27$), while the mean depression ($M_{T1} = 6.17$) was not dissimilar to the previous study ($M = 6.40$). The earlier study suggested that the negative impact on patient well-being observed in their research might

be attributed to the COVID-19 pandemic during which the data was collected [17]. It is plausible that the pandemic-related adverse effect on well-being was no longer present in the current patient population.

Finally, we were unable to confirm that a positive evaluation of the intervention would increase its effectiveness, which would have been expected based on previous research [38]. There are two possible explanations for this. First, the lack of a significant association between the intervention evaluation and the change in informedness may be due to a substantial ceiling effect in the evaluations. Patients predominantly assessed the intervention as good or very good, resulting in limited variability in the data. Second, the effectiveness of the intervention might not depend on whether patients perceive it as positive or not.

Our study had several limitations. First, the sample size was smaller than planned, primarily due to the challenge of recruiting patients who were both sufficiently healthy to participate and had a long enough hospital stay. Second, the study was conducted in a single centre, limiting the results' generalizability. Third, some T2 surveys were conducted over the telephone for patients who had already been discharged from the hospital. This approach may have introduced a confounding effect on their well-being measures at T2. Finally, the study lacked a control group as a basis for comparison, which would have made it possible to isolate the effects of the intervention.

Future research should explore whether patient counselling can encourage compliance with contact isolation measures and other protective behaviours to prevent the spread of MDROs in healthcare facilities. Moreover, it should be investigated whether the intervention improves patient satisfaction in other settings requiring contact precautions beyond MDROs. Patients' cultural background and language skills might influence the type of questions asked, so future studies should account for these factors to ensure effective communication and understanding across diverse patient populations. For healthcare facilities planning to implement a similar intervention, we recommend considering age-appropriate language for children and adolescents and providing translator support when needed. Finally, we acknowledge the challenges in scaling this intervention due to resource constraints. Hospitals might utilize well-trained medical students, while future studies could explore using digital health technologies, such as carefully trained chatbots, as cost-effective alternatives.

This is the first study to assess the effect of tailored in-person counselling sessions on isolated patients' understanding of their situation, satisfaction, and well-being in a German hospital. The counselling led to a significant increase in patients' perceived informedness, resulting in a notable decrease in dissatisfaction. This shows that it is vital to develop an effective communication strategy for patients with MDROs, which can help to reduce the negative effects of contact isolation. Healthcare professionals can ensure that patients are well informed about their treatment and feel engaged and empowered, leading to a more favourable healthcare experience.

Acknowledgements

We would like to thank all the patients whose cooperation made the study feasible, and Magdalena Probst for helping to collect the data. In addition, we want to thank the infection control nurse team for their substantial support in preparing and during the study.

Author contributions

V.G.: investigation (data collection), data curation, formal analysis, writing — original draft. A.R.: methodology, writing — review & editing. A.C.P.: methodology, writing - review & editing; S.D.: investigation (data collection); W.S.B.: resources, conceptualization, writing — review & editing; S.G.: conceptualization, methodology, formal analysis, project administration, supervision, visualization, writing — original draft, writing — review & editing.

Conflict of interest statement

None.

Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jhin.2024.09.022.

References

[1] WHO. Global report on infection prevention and control. Available at: https://www.who.int/publications-detail-redirect/9789240051164 [last accessed April 2024].
[2] Cassini A, Högberg LD, Plachouras D, Quattrocchi A, Hoxha A, Simonsen GS, et al. Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European Economic Area in 2015: a population-level modelling analysis. Lancet Infect Dis 2019;19:56—66.
[3] Theuretzbacher U, Outterson K, Engel A, Karlén A. The global preclinical antibacterial pipeline. Nat Rev Microbiol 2020;18:275—85.
[4] KRINKO. Hygienemaßnahmen zur Prävention der Infektion durch Enterokokken mit speziellen Antibiotikaresistenzen. Bundesgesundheitsbl 2018;61:1310—61.
[5] KRINKO. Hygienemaßnahmen bei Infektionen oder Besiedlung mit multiresistenten gramnegativen Stäbchen. Bundesgesundheitsbl 2012;55:1311—54.
[6] KRINKO, Ruscher C. Empfehlungen zur Prävention und Kontrolle von Methicillin-resistenten Staphylococcus aureus-Stämmen (MRSA) in medizinischen und pflegerischen Einrichtungen. Bundesgesundheitsbl 2014;57:695—732.
[7] Purssell E, Gould D, Chudleigh J. Impact of isolation on hospitalised patients who are infectious: systematic review with meta-analysis. BMJ Open 2020;10:e030371.
[8] Abad C, Fearday A, Safdar N. Adverse effects of isolation in hospitalised patients: a systematic review. J Hosp Infect 2010;76:97—102.
[9] Sharma A, Pillai D, 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.
[10] Hossain MM, Sultana A, Purohit N. Mental health outcomes of quarantine and isolation for infection prevention: a systematic umbrella review of the global evidence. Epidemiol Health 2020;42:e2020038.
[11] Rump B, Timen A, Verweij M, Hulscher M. Experiences of carriers of multidrug-resistant organisms: a systematic review. Clin Microbiol Infect 2019;25:274—9.

[12] 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.
[13] Linda Barratt R, Shaban R, Moyle W. Patient experience of source isolation: lessons for clinical practice. Contemporary Nurse 2011;39:180—93.
[14] Criddle P, Potter J. Exploring patients' views on colonisation with meticillin-resistant Staphylococcus aureus. Br J Infect Control 2006;7:24—8.
[15] 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.
[16] Rees J, Davies HR, Birchall C, Price J. Psychological effects of source isolation nursing (2): patient satisfaction. Nurs Stand. 2000;14:32—6.
[17] Gaube S, Däumling S, Biebl I, Rath A, Caplunik-Pratsch A, Schneider-Brachert W. Patients with multi-drug-resistant organisms feel inadequately informed about their status: adverse effects of contact isolation. J Hosp Infect 2023;133:89—94.
[18] European Centre for Disease Prevention and Control. Antimicrobial resistance in the EU/EEA (EARS-Net) — Annual Epidemiological Report 2022. Stockholm: ECDC; 2023. Available at: https://www.ecdc.europa.eu/en/publications-data/surveillance-antimicrobial-resistance-europe-2022 [last accessed May 2024].
[19] Petermann F. Hospital Anxiety and Depression Scale, Deutsche Version (HADS-D). Z Klin Psychol Psychiatr Psychother 2011;59:251—3.
[20] Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale: An updated literature review. J Psychosom Res 2002;52:69—77.
[21] Jenkinson C, Coulter A, Bruster S. 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.
[22] Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index: a simple index of independence useful in scoring improvement in the rehabilitation of the chronically ill. Md Med 1965;14:61—5.
[23] Roffman CE, Buchanan J, Allison GT. Charlson Comorbidities Index. J Physiother 2016;62:171.
[24] Buuren S van, Groothuis-Oudshoorn K, Vink G, Schouten R, Robitzsch A, Rockenschaub P, et al. mice: Multivariate Imputation by Chained Equations. Available at: https://cran.r-project.org/web/packages/mice/index.html; 2023 [last accessed October 2023].
[25] Tingley D, Yamamoto T, Hirose K, Keele L, Imai K, Trinh M, et al. mediation: Causal Mediation Analysis. Available at: https://cran.r-project.org/web/packages/mediation/index.html; 2019 [last accessed October 2023].
[26] Ferreira DC, Vieira I, Pedro MI, Caldas P, Varela M. Patient satisfaction with healthcare services and the techniques used for its assessment: a systematic literature review and a bibliometric analysis. Healthcare (Basel) 2023;11:639.
[27] 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.
[28] Ward D. Infection control: reducing the psychological effects of isolation. Br J Nurs 2000;9:162—70.
[29] Barbosa CD, Balp MM, Kulich K, Germain N, Rofail D. A literature review to explore the link between treatment satisfaction and adherence, compliance, and persistence. Patient Prefer Adherence 2012;6:39—48.
[30] Krot K, Sousa JP. Factors impacting on patient compliance with medical advice: empirical study. Engineering Management in Production and Services 2017;9:73—81.
[31] Martin LR, Williams SL, Haskard KB, DiMatteo MR. The challenge of patient adherence. Ther Clin Risk Manag 2005;1:189—99.
[32] Okonta K, Ogaji D. Relationship between patient satisfaction and willingness to comply with physicians' recommendation in referral surgical outpatient clinic in Nigeria. J Patient Exp 2020;7:1556—62.
[33] Gold DT, McClung B. Approaches to patient education: emphasizing the long-term value of compliance and persistence. Am J Med 2006;119:S32—7.
[34] Hojat M, Louis DZ, Maxwell K, Markham F, Wender R, Gonnella JS. Patient perceptions of physician empathy, satisfaction with physician, interpersonal trust, and compliance. Int J Med Educ 2010;1:83—7.
[35] Billing K, Newland H, Selva D. Improving patient satisfaction through information provision. Clin Exp Ophthalmol 2007;35:439—47.
[36] Vermeir P, Vandijck D, Degroote S, Peleman R, Verhaeghe R, Mortier E, et al. Communication in healthcare: a narrative review of the literature and practical recommendations. Int J Clin Pract 2015;69:1257—67.
[37] Batbaatar E, Dorjdagva J, Luvsannyam A, Savino MM, Amenta P. Determinants of patient satisfaction: a systematic review. Perspect Public Health 2017;137:89—101.
[38] Sekhon M, Cartwright M, Francis JJ. Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. BMC Health Serv Res 2017;17:88.