



Narrative Review

The human cost of resistance: ethical implications of coping with isolation for multidrug resistant organisms

Sibylle C. Mellinghoff^{1,2,3,*}, Alessandra A. Grossi^{4,5}, Claudia Recanatini^{6,7},
Leonie Breull-Wierschem¹, Florian Salm⁸, Mariacarla Gadebusch-Bondio^{9,†},
Norma Jung^{1,†}

¹) Department I of Internal Medicine, University of Cologne, Faculty of Medicine and University Hospital Cologne, Centre for Integrated Oncology Aachen Bonn Cologne Duesseldorf (CIO ABCD), Department I of Internal Medicine, Division of Infectious Diseases and Excellence Centre for Medical Mycology (ECMM), Cologne, Germany

²) German Center for Infection Research Deutsches Zentrum für Infektionsforschung (DZIF), Partner Site Bonn-Cologne, Cologne, Germany

³) University of Cologne, Faculty of Medicine and University Hospital Cologne, Institute of Translational Research, Cologne Excellence Cluster on Cellular Stress Responses in Aging-Associated Diseases (CECAD), Cologne, Germany

⁴) Department of Human Sciences and Innovation for the Territory, University of Insubria, Varese, Italy

⁵) Centre for Clinical Ethics, Department of Biotechnologies and Life Sciences, University of Insubria, Varese, Italy

⁶) Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht University, Utrecht, The Netherlands

⁷) Department of Health Promotion, Care and Public Health Research Institute (CAPHRI), Maastricht University, Maastricht, The Netherlands

⁸) Institute for Infection Prevention and Hospital Epidemiology, Medical Center-University of Freiburg, Faculty of Medicine, University of Freiburg, Freiburg, Germany

⁹) Institute for Medical Humanities, Faculty of Medicine and University Hospital, Bonn, Germany

ARTICLE INFO

Article history:

Received 11 December 2025

Received in revised form

26 May 2026

Accepted 27 May 2026

Available online 5 June 2026

Editor: L. Leibovici

Keywords:

Ethical debate

Isolation

Multidrug resistance

Patient autonomy

Patient-centred medicine

ABSTRACT

Background: Isolation of individuals colonized or infected with multidrug-resistant organisms (MDROs) is an established strategy to prevent transmission in healthcare settings. Although protective measures such as single-room placement and use of personal protective equipment are designed to safeguard vulnerable patients, growing evidence suggests that community transmission contributes substantially to the spread of certain MDROs, raising questions about the proportionality and necessity of routine isolation. At the same time, isolation has been associated with adverse effects, including reduced quality of clinical care, delays in treatment, and psychological and social burdens that may negatively influence recovery. These observations yield ethical tension between ensuring patient and public safety and respecting the autonomy and well-being of isolated individuals.

Objectives: This narrative review synthesizes current clinical evidence and ethical debate surrounding MDRO-related isolation practices.

Sources: A literature search was performed in PubMed covering publications from January 2015 through January 2025.

Content: We examine outcomes associated with isolation, discuss ethical implications and potential alternatives, and propose an integrative epistemic-ethical perspective that combines empirical data with normative analysis.

Implications: Our findings highlight the need for transparent, proportionate, and evidence-based decision making supported by interdisciplinary dialogue. Moving towards a more balanced and human-centred approach to infection prevention requires frameworks that mitigate harm, maintain safety, and promote compassionate, sustainable healthcare practice. **Sibylle C. Mellinghoff, Clin Microbiol Infect 2026;32:1244**

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* Corresponding author: Department I of Internal Medicine, University of Cologne, Faculty of Medicine and University Hospital Cologne, Centre for Integrated Oncology Aachen Bonn Cologne Duesseldorf (CIO ABCD), Department I of Internal Medicine, Division of Infectious Diseases and Excellence Centre for Medical Mycology (ECMM), Kerpener Str. 62, 50937 Cologne, Germany.

E-mail address: sibylle.mellinghoff@uk-koeln.de (S.C. Mellinghoff).

† These authors contributed equally to this work.

Introduction

Individuals colonized or infected with multidrug-resistant organisms (MDROs) are often isolated in healthcare settings to prevent spread [1,2]. This typically involves personal protective equipment and single-room placements. Although the prevention of MDRO spread is vital, particularly for immunocompromised or critically ill patients, the need for isolation is currently under debate [3] as evidence suggests that, for some pathogens, transmission occurs in the community setting to a large degree and not necessarily in healthcare facilities [4]. Isolation is further questioned due to its impact on patients potentially leading to significant deterioration in clinical care [5] as well as psychological and social impairment [6,7]. These effects can significantly influence patient recovery, trust in care, and adherence to treatment [5]. These challenges highlight the importance of performing studies to further evidence considering all aspects and improving how isolation is implemented. Nonetheless, ethical challenges arise from the tension between the responsibility to protect patient safety by preventing infections and respecting patient autonomy. Given the necessity of isolation as a safety measure, we ask what trade-offs must be accepted in enforcing it and what aspects can be optimized.

We aimed to examine and synthesize the clinical and ethical dimensions of this complex issue. We first review evidence supporting isolation measures, then examine consequences for individuals, communities, and healthcare systems. Our ethical analysis of MDRO prevention argues for a more balanced, human-centred approach to infection prevention grounded in clinical evidence, ethical principles, and core values.

Methods

We conducted a narrative review to synthesize empirical evidence and ethical standpoints concerning the isolation of individuals infected or colonized with MDROs. A literature search was performed in PubMed covering publications from January 2015 through January 2025. The search strategy combined Medical Subject Headings and free-text terms, with the full search string provided in [Appendix A](#). Key search concepts included MDROs, isolation precautions or contact precautions, infection control, patient experience or patient outcomes, and ethics or ethical considerations. Articles were included if they addressed MDRO-related isolation or contact precautions, reported clinical, psychological, social, or experiential patient outcomes, and/or discussed ethical or normative aspects of isolation practices. We included empirical studies, systematic reviews, qualitative research, and ethical analyses. Titles and abstracts were screened for relevance, followed by full-text review. Screening was conducted independently by two reviewers, and discrepancies were resolved through discussion to achieve consensus. From each included article, we assessed study characteristics, the type of isolation practice examined, reported patient outcomes, and ethical themes or arguments where applicable. Broad patient outcomes were used to capture the multidimensional impact of isolation practices, including clinical outcomes (such as infection rates and complications), psychological outcomes (including anxiety, depression, and distress), social outcomes (such as stigma and loneliness), and experiential outcomes (including perceived quality of care and communication). Findings were synthesized using an interpretive narrative approach in which clinical and experiential evidence were analysed alongside ethical arguments to identify recurring themes, tensions, and areas of convergence. Rather than statistical pooling, emphasis was placed on conceptual integration and critical comparison across disciplines.

Clinical and psychosocial consequences of isolation: how do infection control measures impact patient outcomes?

Isolation measures aim to prevent MDRO transmission, particularly in vulnerable patients. The use of coats, gowns, gloves, masks, and single rooms are widely implemented and reduce hospital-acquired infections [8,9]. However, evidence on their effectiveness is heterogenous, varying by intervention type, implementation burden, and healthcare setting [3]. Emerging data suggest that a significant proportion of MDRO transmission may occur outside hospital walls, in community settings such as long-term care facilities, outpatient clinics, and households [4]. Whole-genome sequencing analyses support that multiple community introductions significantly impact hospital MDRO epidemiology [10]. The effectiveness of isolation strategies is therefore context-dependent and should be tailored to the microorganism, local epidemiology, and transmission risk.

Reduction of interaction between patient and healthcare workers

It has been shown that patients in isolation frequently receive fewer visits from clinicians and spend less time interacting with healthcare workers. A prospective cohort study conducted in the United States demonstrated that healthcare workers were half as likely to enter the rooms of isolated patients ($n = 219$ room entries), with mean hours of direct contact reduced from 4.2 to 2.1 h/d ($p = 0.03$) [11]. This causes delays in diagnostic testing, treatment decisions, and medical attention. A retrospective observational study in acute care hospital patients similarly found reduced exposure of physicians to isolated patients associated with donning protective equipment prior to room entry [12]. Furthermore, isolated patients were shown to be examined less frequently, with attending physician examinations in 35% (isolated) compared with 73% of (nonisolated) cases [13]. A systematic review of 16 studies in international settings supports these findings [14]. This lack of interaction contributes to adverse clinical consequences, such as higher rates of adverse events. Adults isolated for methicillin-resistant *Staphylococcus aureus* (MRSA) were twice as likely to experience adverse events, with an eight-fold increase in supportive care failures, although hospital mortality did not differ [14]. A systematic review and meta-analysis of hospitalized adult patients found that isolation was associated with a trend towards lower care quality and higher risk of adverse events, although results varied across studies [15]. Some studies reported relative risk as high as 18 for adverse events, suggesting that isolation may contribute to clinically relevant harms beyond infection prevention [16,17]. Isolation can prolong hospital stays, especially when discharge or transfer depends on available isolation facilities. A Canadian cohort study found that patients isolated for MRSA had stays 17% longer than controls, with higher 30-day readmission rates [5]. Isolation also complicates transfers to other clinics or departments, limiting access to specialized care and rehabilitation. Group therapies, peer interaction, and engagement with staff are often disrupted, delaying functional recovery, particularly in post-acute and elderly patients [18–20]. Facilities with high MDRO prevalence face additional barriers, highlighting the need for guidelines that balance rehabilitation access with infection control [19]. Long-term data on isolation's impact on rehabilitation outcomes remain limited.

Emotional, psychological, and social burden by isolation

Hospitalized patients often experience significant emotional, psychological, and social challenges when placed in isolation.

Many international studies report higher depression and anxiety among isolated patients [21,22], with a recent meta-analysis showing standardized mean differences of 1.28 for depression and 1.45 for anxiety [14,15]. Despite high heterogeneity, results consistently link isolation to poorer psychological outcomes and challenges in care adherence. Psychological support has been suggested as a potential intervention, although evidence is limited.

Qualitative studies report that many patients feel stigmatized and socially excluded, which can erode trust in healthcare providers and worsen feelings of helplessness. Isolation can exacerbate mental health issues, accelerating cognitive decline, delirium, and depression [23,24]. Lack of interaction and stimulation can accelerate cognitive decline, worsen confusion or delirium, and amplify depressive symptoms [25]. Reduced interpersonal contact contributes to heightened feelings of loneliness and alienation, both of which are well-recognized risk factors for poor psychological outcomes and delayed recovery.

The presented studies show that isolation precautions are an ambivalent experience for patients: necessary for safety but costly to dignity, connection, and perceived quality of care.

Ethical aspects: balancing infection control between doing good and not harming

Management of MDROs cannot be understood solely as a biomedical or scientific problem. Moral conflicts arise at both the macrolevel and microlevels of the healthcare system, affecting both individual interactions and public health [26]. The need to protect vulnerable patients and prevent outbreaks must hence be weighed against the obligation to isolate MDRO carriers while treating them with dignity. Furthermore, equitable care for all patients must be ensured, and broader concerns such as environmental sustainability must be considered. These ethical challenges cannot be viewed in isolation from the biomedical entities—the MDROs—and the scientific evidence regarding pathogenesis, transmission mechanisms, and prevention strategies. Some authors have recognized the need for a critically reflective and ethically grounded approach to the existing evidence on MDROs.

The fact that moral tensions challenge infection prevention has recently been highlighted in a Dutch study recently [27]. (The analysis revealed four areas of moral conflict associated with infection prevention practice in healthcare providers: preventing transmission versus safeguarding patient well-being, dedicating extra time to MDRO carriers at the expense of other patients, protecting personal safety while fulfilling the duty to care, and balancing the need for protective equipment with its environmental impact.) Qualitative empirical studies also confirm that, in addition to the clinical and psychosocial consequences on carriers, control measures have numerous ethically questionable effects. To explore the ethical implications of infection control measures in the context of MDRO, 227 consultations showed that control measures have multiple negative implications as illustrated in Table 1. Instead of asking whether it is justified to impose control measures, Rump *et al.* [28] ask, “How can we best care for this person’s carriage and well-being in ways that do not imply unacceptable risk for transmission to other patients?” The authors adopt a context- and patient-related perspective that shifts the focus to care-oriented management under constraints. From a public health perspective, Giubilini and Savulescu [29] offer guidance on ethical principles and justificatory conditions for infection control measures. These include aspects such as proportionality of isolation measures, as well as reciprocity, requiring that burdens on individuals be minimized or appropriately compensated. Highlighting equity as an integral public health principle, harm to all and particularly to vulnerable groups must be reduced as much as possible. The application of such precautions offers a normative framework to address

Table 1

Ethical implications of infection control measures in the context of multidrug-resistant organisms along Rump *et al.* [28]

Problems with access to healthcare	- Postponement of planned surgeries. - Cancellation of admissions to rehabilitation programs. - Denial of transfer to other clinics or departments.
Restrictions within healthcare facilities	- Exclusion from organized social activities. - Being prohibited from dining with fellow residents or participating in communal events.
Broader ethical concerns	- Negative effects on well-being, autonomy, and health-related justice. - Limitations on opportunities to work, engage socially, or maintain meaningful relationships.

moral tensions identified by Damsté *et al.* [27], such as balancing patient well-being with infection control, protecting healthcare workers, and addressing sustainability.

Ethical justification of clinically effective measures has the advantage that these measures can be communicated in a transparent and comprehensible manner, which in turn strengthens the trust of patients and the general public in healthcare providers. The biomedical ethical principles of Beauchamp and Childress [30], considered capable of fostering consensus, provide a rationale that is easily communicated to those affected. With regard to the principle of autonomy, active surveillance and contact precautions generally do not require specific informed consent, as they are considered standard medical care. Given personal restrictions associated with isolation, it is imperative to provide patients with detailed reasons for and implications of isolation. Only transparent communication can foster understanding and cooperation [30,31]. The principle of beneficence justifies isolation measures to protect both individual patients and the general population from infection transmission. At the same time, healthcare providers must ensure that no unbalanced side effects come to the isolated individuals. To this end, adequate care, emotional support, and access to medical and psychological resources must be guaranteed [28].

However, this can only gain societal acceptance if isolation guidelines are applied fairly and consistently, and any discrimination in the isolation of individuals should be avoided. Age, ethnicity, socioeconomic status, or other characteristics must not influence the decision to isolate a patient. Only if resources such as protective equipment, staff time, and support services are allocated equitably, dignified care can be ensured [28,31].

In our context, drawing on the four classic principles of biomedical ethics offers easily communicable, consensus-building justifications. Transparency promises acceptance from all stakeholders involved. The relevance of an ethical justification for preventive isolation practices in clinical setting cannot be overstated. Especially in times when obscurantist tendencies challenge evidence-based findings of infectious disease medicine and preventive medicine, empowering patients, vulnerable groups, and society to understand and support the goals and methods of prevention plays an essential role. Although principlism offers a pragmatic and widely accepted framework for justifying preventive isolation, the moral complexity of everyday clinical practice requires healthcare professionals to draw on deeply ingrained moral resources, cultivated through the development of professional virtues. A more critical ethical reflection therefore involves not only the application of established principles but also making explicit the value judgements that shape clinical decision making [32]. This includes clarifying the goals guiding preventive measures and scrutinizing the assumptions and priorities underlying them. From a consequentialist perspective, isolation is justified by its effectiveness in reducing transmission and protecting

Table 2
Implications of isolation for clinical care.

Key issues and approaches	Background explanation
Isolation is useful but evidence is heterogeneous	Contact precautions can reduce multidrug-resistant organism transmission, but decisions regarding their implementation should be tailored to the specific microorganism, local epidemiology, patient population, and the risk profile of the healthcare setting.
Isolation may negatively affect clinical outcomes	Isolated patients may receive less frequent monitoring and delayed interventions, which can increase adverse events, prolong hospital stays, and reduce care quality. Active mitigation of care gaps is essential.
Isolation may negatively impact psychological health and enhance social isolation	Isolation is associated with anxiety, depression, loneliness, and stigma, particularly in vulnerable groups. These effects can impair recovery and should be considered clinically significant.
Isolation pathways should include supportive care standards	Isolation protocols should explicitly include minimum standards for communication, rehabilitation access, mobility, and psychological support—not only infection control measures.
Isolation decisions should be made in multidisciplinary and guideline-based processes	Isolation decisions should be supported by clear, easily communicable institutional guidelines developed jointly by infection control teams, clinicians, and ethics input, ensuring consistency, transparency, and fairness.
Isolation decisions should be proportionate and patient-centred	Isolation should be guided by evidence, proportionality, and individual patient context, balancing infection prevention benefits against clinical, psychological, and ethical burdens.

public health [33,34]; however, this approach remains primarily outcome-oriented and may insufficiently capture the lived experiences of affected individuals. Differently, virtue ethics does not primarily offer an alternative justificatory framework but complements principlism by focusing on practical wisdom of those involved. It highlights the importance of virtues such as compassion, fairness, prudence, and courage, alongside epistemic qualities such as diligence and transparency. These qualities shape how ethical principles are interpreted, balanced, and implemented in concrete situations. Thereby, virtue ethics informs the attitudes, motivations, and dispositions of healthcare professionals, patients, and families, enabling context-sensitive and responsive ethical practice. In this sense, principlism and virtue ethics are complementary, as they can be mobilized by different actors and at different stages of decision making. At the same time, this perspective points to a deficit in interdisciplinary integration: the insufficiently structured collaboration between clinicians, ethicists, and philosophers in jointly shaping normative and practical responses. A more developed ethical framework would actively integrate these perspectives, enabling mutual refinement of empirical insight, normative analysis, and practical judgement. Such collaboration is essential for arriving at robust, context-sensitive decisions in infection prevention, where neither biomedical evidence nor ethical principles alone are sufficient to capture the complexity of clinical reality.

We have identified an urgent need to bridge the gap between ethical theory and practical decision making and call for interdisciplinary approaches to support clinically effective, ethically sound, and sustainable isolation strategies in healthcare. This entails the active implementation of evidence- and ethics-based approaches, e.g. in the development of clinical guidelines that take the patient's perspective into account (Table 1). Effective infection prevention requires the cooperation of all stakeholders involved. In practice, clear, easily

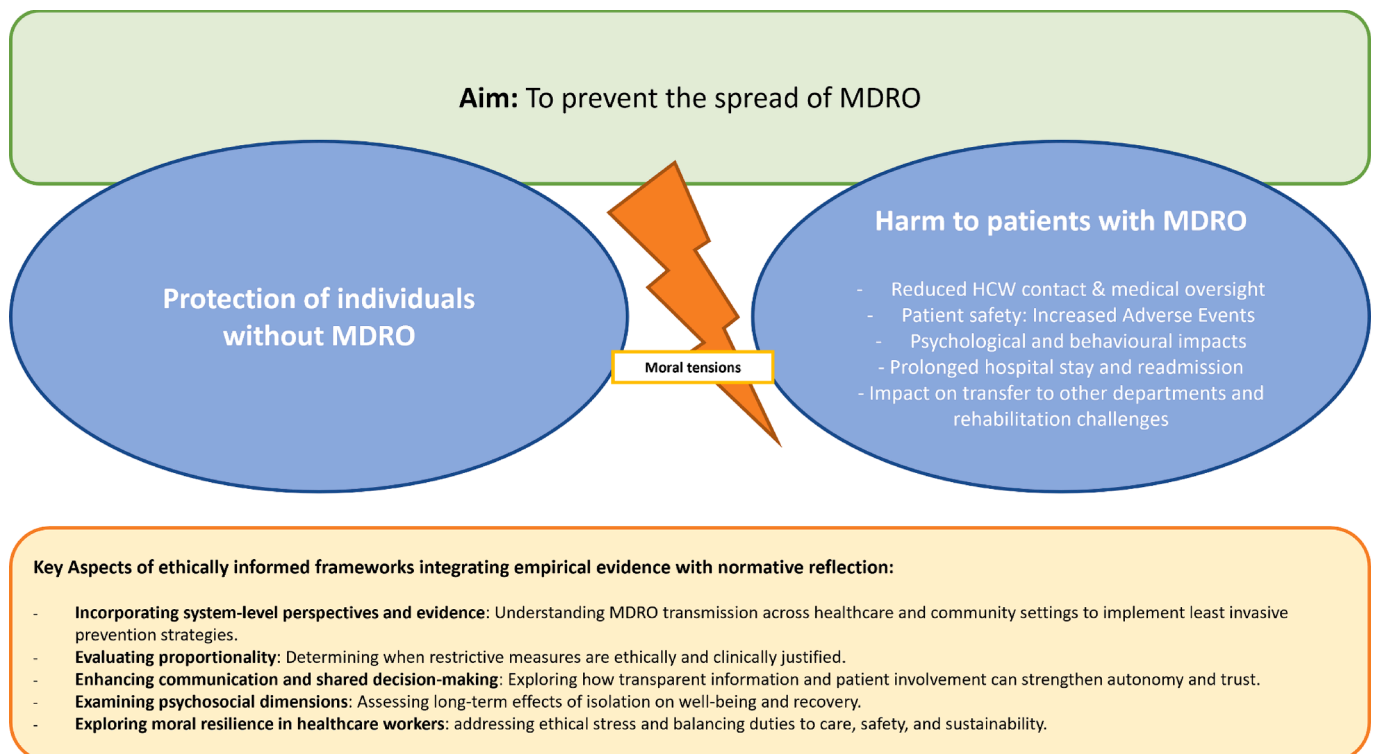


Fig. 1. Moral tensions and key aspects of ethically informed frameworks integrating empirical evidence with normative reflection. HCW, healthcare worker; MDRO, multidrug-resistant organism.

communicable ethical justifications can help physicians, nurses, therapists, patients, family members, and friends to engage with the issues at hand from their respective positions and within the given scope of action.

Outlook and overall conclusion

MDRO management comprises the ethical tension between preventing infection in potentially large numbers of people and respecting the rights of contaminated individuals. Protective measures aim to yield patient safety and prevent transmission but also bring negative personal affects. Ethically, such restrictions can only be justified if they are evidence-based and proportionate. As outlined, decisions regarding isolation should consider moral, psychological, and social consequences at individual, institutional, and societal levels (Table 2). Future research should focus on developing ethically informed frameworks that integrate empirical evidence with normative reflection. Key priorities are depicted in Fig. 1.

We call for an open and interdisciplinary dialogue integrating clinicians, bioethicists, policymakers, scientists, and representatives of affected communities. Central to this discussion incorporating clinical and social dimensions of isolation are several unresolved ethical questions: How can clinicians be provided with robust and practical guidance to inform their decision making? What alternatives to isolation might exist that could reduce its potential harms while maintaining patient and public safety? How can healthcare systems ensure that individuals put to isolation receive both adequate protection and compassionate care? These considerations must be placed within a broader framework that takes responsibility for the sustainability of healthcare. In doing so, medicine is guided back towards its role as a genuine healing profession.

CRedit authorship contribution statement

SCM implemented the research and drafted the manuscript. AAG reviewed the literature and co-authored the manuscript. CR reviewed the literature and co-authored the manuscript. LBW reviewed the literature and co-authored the manuscript. FS reviewed the literature and co-authored the manuscript. MCGB implemented the research and drafted the manuscript. NJ implemented the research and drafted the manuscript.

Transparency declaration

Potential conflict of interest

SCM reports grants or contracts from Else Kröner Fresenius Stiftung (EKFS), the Medical Faculty of the University of Cologne, and DZIF; consulting fees from Octapharma; speaker and lecture honoraria from Pfizer, Gilead, GSK, Deutsche Gesellschaft für Infektiologie (DGI), AstraZeneca, Vitis Healthcare, and KAro. All other authors declare that they have no conflicts of interest.

Declaration of AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT and OpenEvidence in order to improve readability and language and to assist in verifying references. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cmi.2026.05.043>.

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